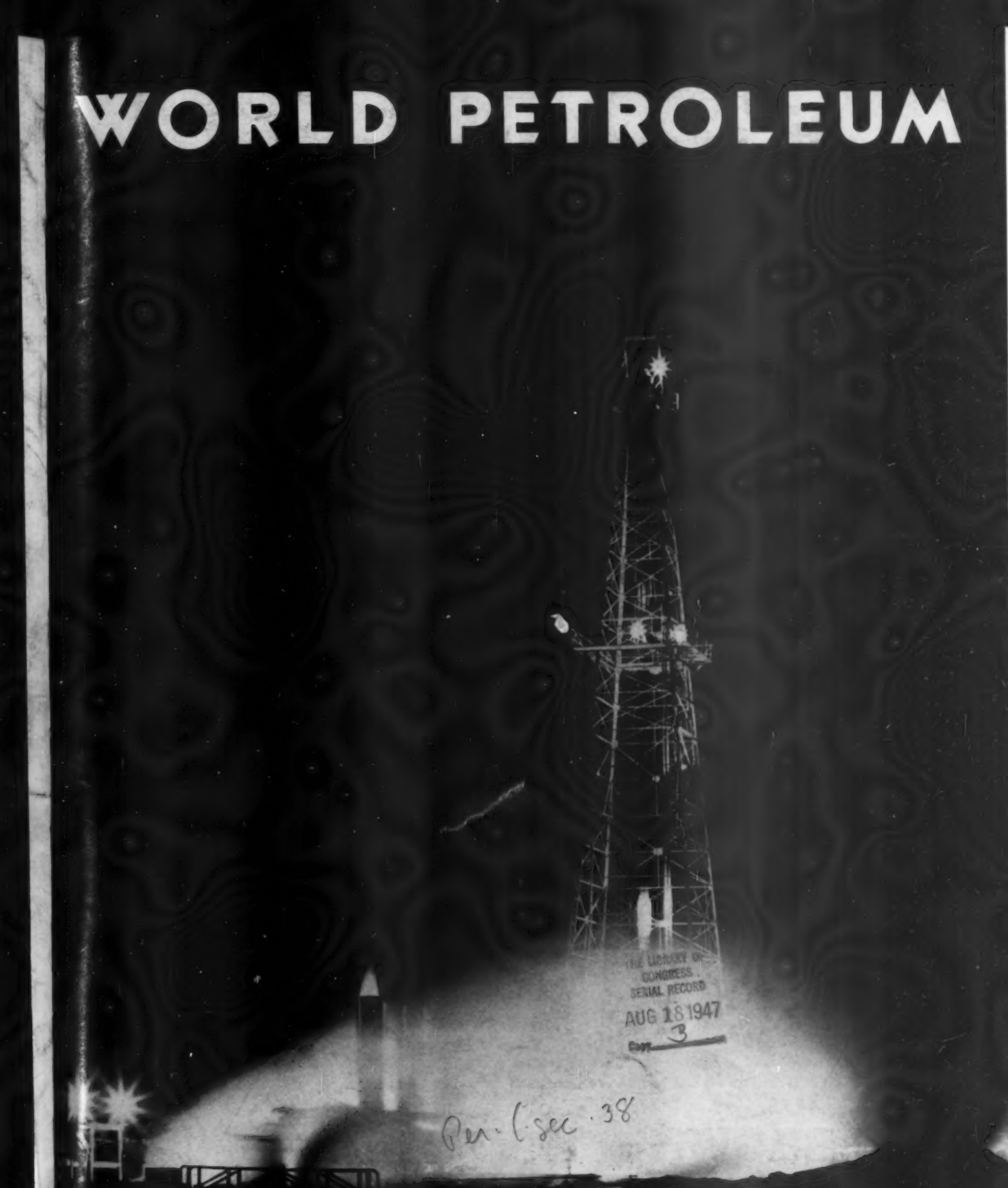
WORLD PETROLEUM



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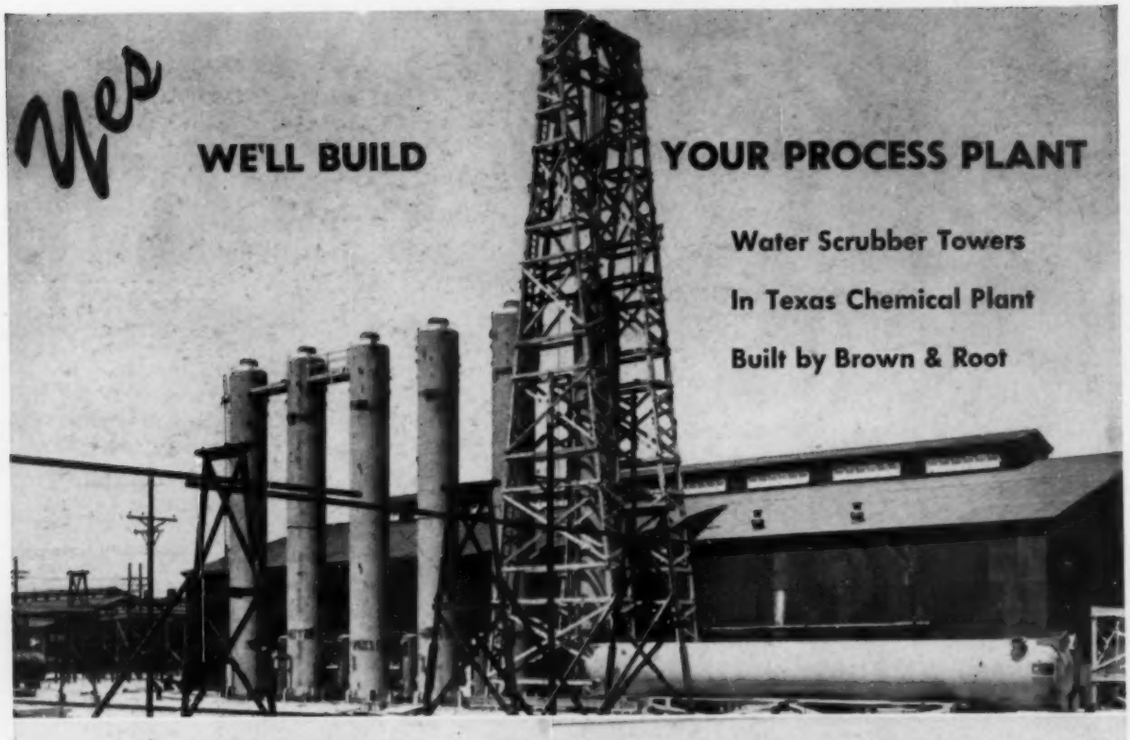

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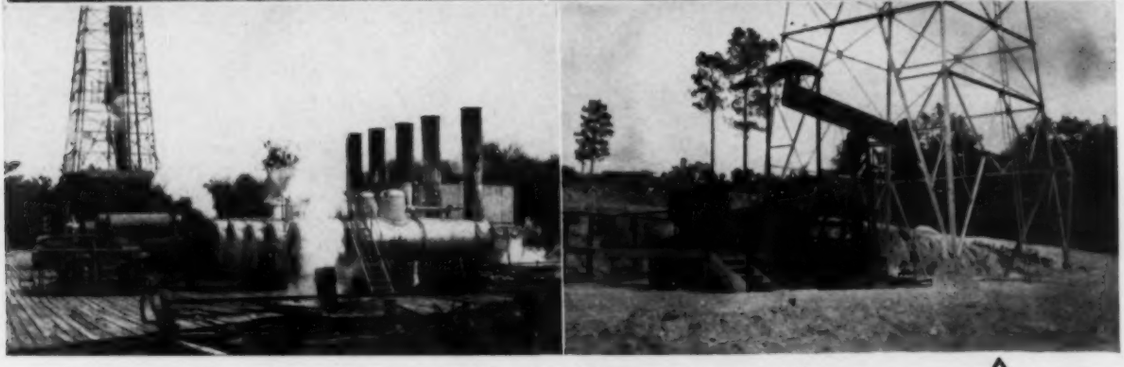

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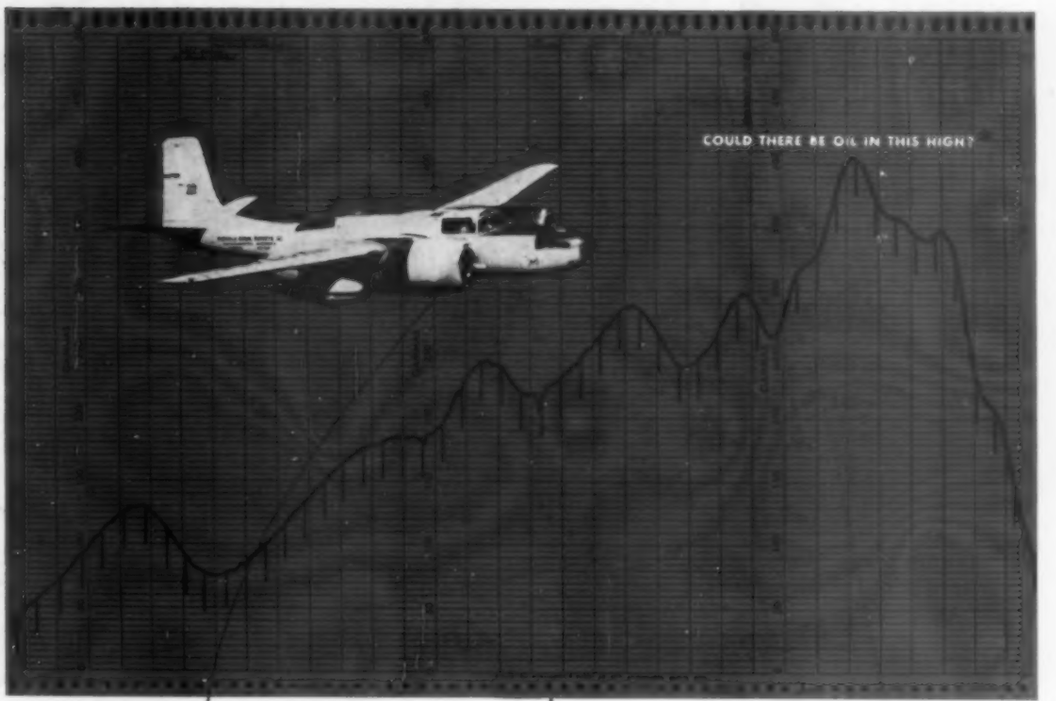
THE NEW MAGNETIC PROFILE FOR THE GEOLOGIST



THIS IS A BASE-FORMATION MAGNETIC PROFILE

Note the Indexing "Pips"—the short vertical marks that follow the profile. They are put into the tape by an automatic timer approximately a mile apart. And every time a "pip" goes into the tape, synchronized cameras "shoot" the ground, the Shoran instrument, the altimeter and other instruments. Thus, the "pips" tie various control data to the magnetic profile.

EXTRANEOUS SURFACE INFLUENCES ARE OUT. The Fairchild Aerial Magnetic Survey is far superior to the ground magnetic survey. The Gulf Airborne Magnetometer, carried high above misleading surface influences, produces a magnetic profile showing only *base-formation* readings.

THE MAGNETIC MAP HAS MATURED. The Airborne Magnetometer plus the Fairchild Control System have opened a new field of possibilities in geological exploration. Write for complete information.

*Yes! There could be oil in that hump. It's in the right formations and several parallel profiles suggest a long and promising fold.

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New National Magazine Campaign Spotlights Petroleum's Progress

Understand Rivalry and you understand America

RIVALRY is Dad forgetting his stiff back to grow the best tomatoes in town. Rivalry is Mom's determination to make a better cake than Mrs. Brown. From county fairs to quiz programs, from baseball games to business, rivalry is in America's blood . . . a thrill and a challenge. We've outdistanced the world because we like to outdistance each other.

Take the American Oil Industry, made up of more than 34,000 individual firms of all sizes. In this competitive business 1,250,000 people make their living in oil production, oil transportation, refining, research, marketing.

Here rivalry spurs progress—finds ways to provide Americans with finer petroleum products at the lowest prices in the world . . . better gasoline, lubricants and fuel oil . . . better things from petroleum in a hundred fields—chemistry, medicine, farming, manufacturing.

The result—better health, a chance to go more places more easily, more comfort . . . more . . . constantly more, for you.

THERE'S A PLUS FOR YOU IN PETROLEUM'S PROGRESS

By "directional drilling," oil wells can now turn corners underground. By advancements such as this, 13,478 oil production companies help build up America's oil reserves.

Today's tankers speed at a rate 50% faster than 20 years ago. 660 companies engage in oil transportation by tanker, barge, pipe-line or rail. Result—better service, lower costs.

Keen competition in refining techniques has developed finer fuel—for planes like Jet P-80 and your car. Some 400 refiners are responsible for over 1200 different oil products.

Over 20,000 distributors and jobbers cooperate to serve you. Example: fuel suppliers chart daily temperatures, forecast your needs according to weather, work, to keep you supplied.

220,000 service stations compete for your favor. Each vies with his neighbors in serving you. Over half a million people are engaged in this familiar phase of the oil business.

Prepared for the Oil Industry by the American Petroleum Institute Copr., 1947

"Understand Rivalry and you understand America"...

That's the theme of the new national magazine campaign recently launched in *Life, Saturday Evening Post, Collier's* and *Look* to explain to the public why "there's a *plus* for you in petroleum's progress." With a dramatic series in pages in full color and black and white—the above ad is the first—the story of *your* business . . . and *every* business . . . is being told to an audience of more than 58,000,000.

Your Part in the Campaign

You know that everyone in every phase of the oil business has a big stake in this campaign. You know the support of *every* oil firm is needed *locally*.

New Plan Book Ready

To help you tie-in and support the program through your own company—a detailed Plan Book has been prepared.

It offers FREE mats of seven different newspaper campaigns, display material, radio scripts, envelope stuffers—a wealth of promotional material which can be used by your firm.

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WORLD PETROLEUM for August, 1947. Vol. 18, No. 9. August, 1947. WORLD PETROLEUM is published monthly by Mona Palmer, Trustee under the will of Russell Palmer, 2 W. 45th St., New York 19, N. Y. Acceptance under the Act of June 5, 1934, at East Stroudsburg, Pa., Authorized September 23, 1946. Subscription rate: $5.00 per year, single copies 50c.

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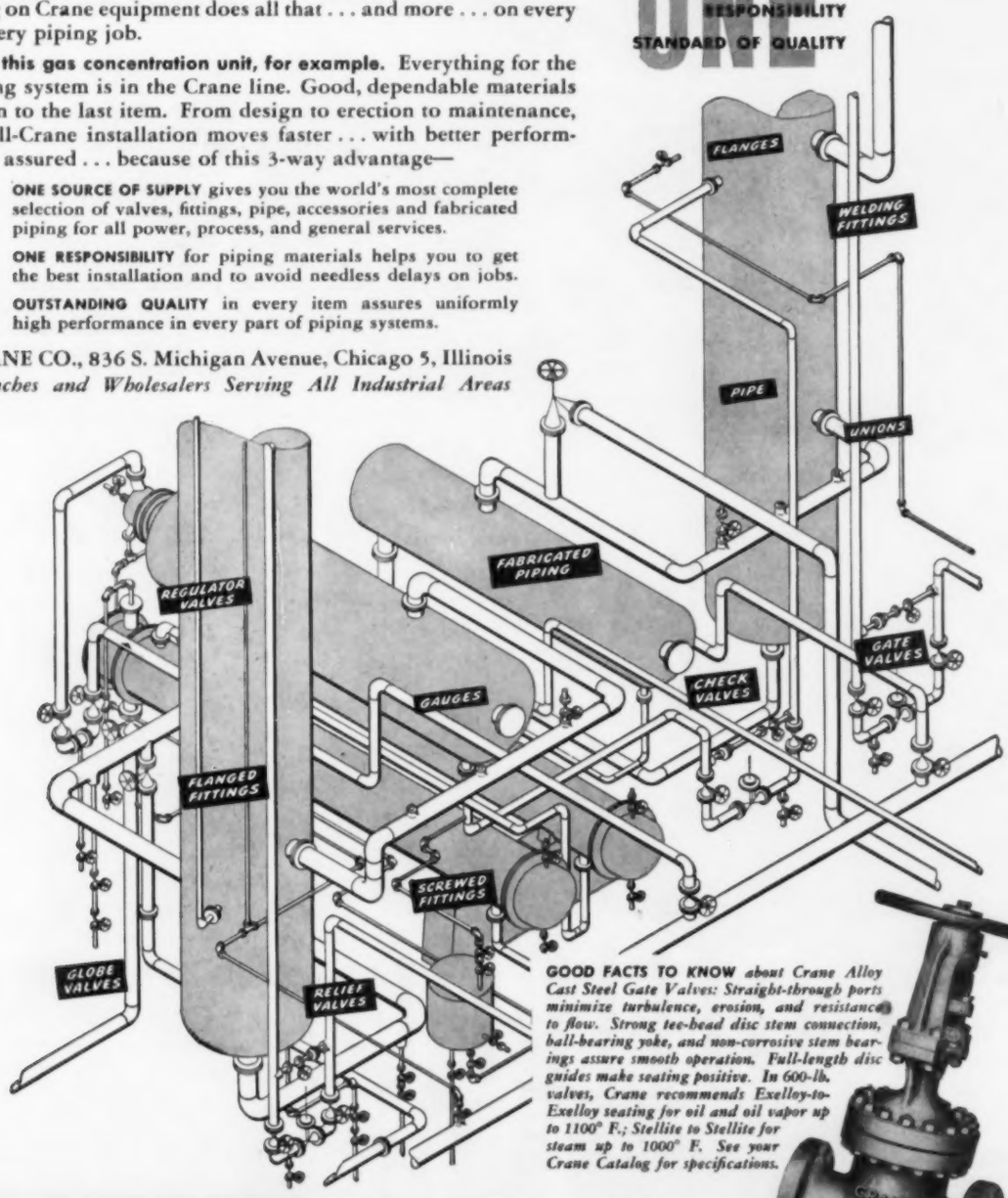

GOOD FACTS TO KNOW *about Crane Alloy Cast Steel Gate Valves: Straight-through ports minimize turbulence, erosion, and resistance to flow. Strong tee-head disc stem connection, ball-bearing yoke, and non-corrosive stem bearings assure smooth operation. Full-length disc guides make seating positive. In 600-lb. valves, Crane recommends Exelloy-to-Exelloy seating for oil and oil vapor up to 1100° F.; Stellite to Stellite for steam up to 1000° F. See your Crane Catalog for specifications.*

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Rambler Rigs speed hoisting as much as 30% because the Hydraulic Torque Converter automatically selects the fastest speed at which a given load can be lifted . . . gives maximum speed for raising empty block . . . maximum pull for coming out of the hole . . . and delivers more horsepower at the hook.

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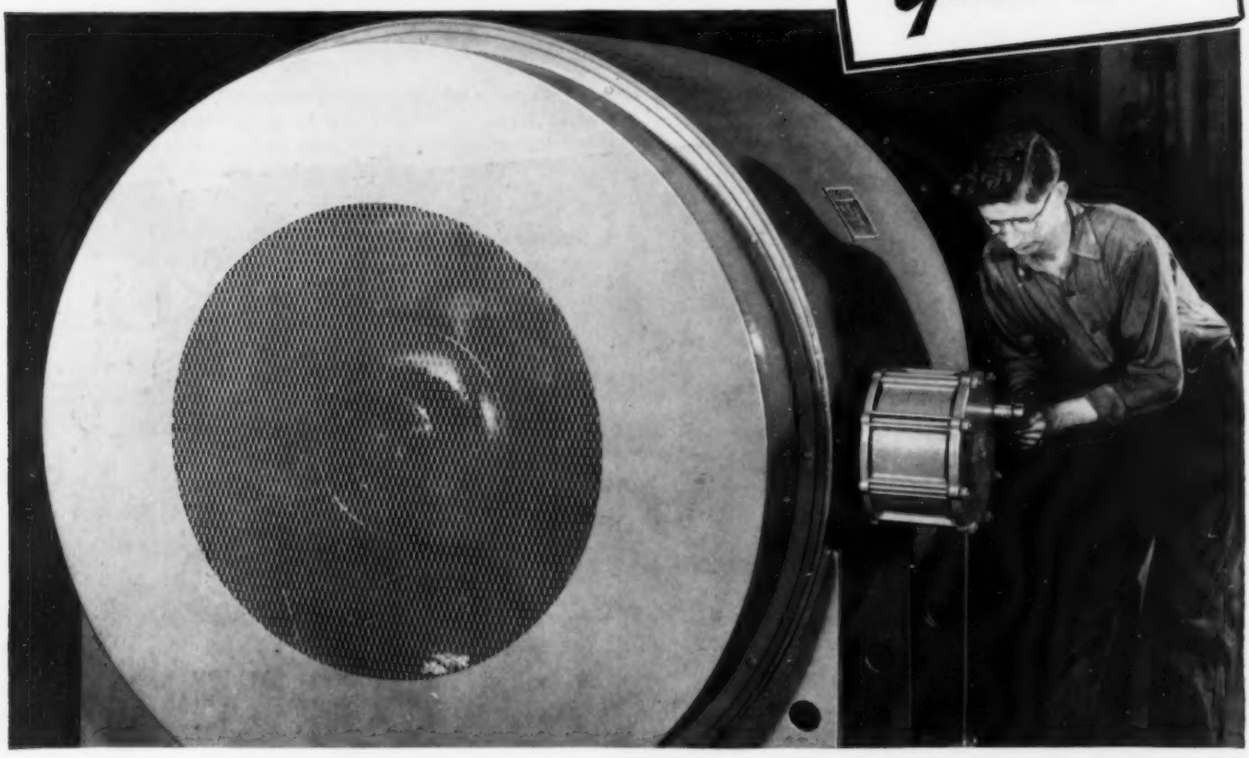

Larger Explosion-Resistant Motors!

A NEW LINE of Allis-Chalmers motors, rated up to 2000 hp and higher, has been specifically designed for application in the Oil Industry. This line meets the particular needs of refineries and pipe line companies, as indicated by the results of a recent Allis-Chalmers survey of leading oil refineries.

Utilizing a basically different type of ventilation system which is extremely simple and practically self-cleaning, the motor is protected against explosive vapors common to many refinery locations.

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This recent development for the Nation's oil lines and refineries is another example of Allis-Chalmers continuing effort to serve the Oil Industry.

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Petroleum Operators, Consultants: This is another in a new series offering practical buying assistance. Today, A-C is working with oil men throughout the world . . . solving problems of expansion and modernization with up-to-date power and processing equipment.

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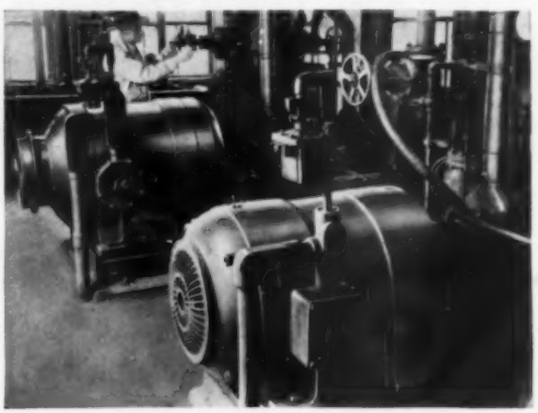
DEPENDABLE MOTORS for practically *any* refinery or pipe line application can be supplied by Allis-Chalmers. In hazardous locations where small and medium size *explosion-proof* motors are required, Allis-Chalmers offers its Underwriter approved Red Motor line in ratings as low as ¾ hp. Besides being completely safe and reliable, these explosion-proof motors incorporate special low-maintenance features, reduce insurance rates, and simplify installation by eliminating need for fire walls, extended shafts and stuffing boxes. Send for bulletin B6145.



Two 100 hp Allis-Chalmers explosion-proof motors driving butane pumps in a midwestern refinery.

FOR THE MANY OTHER APPLICATIONS where *standard* motors answer the need, Allis-Chalmers builds rugged Squirrel Cage, Wound Rotor, Synchronous, Direct Current, and Gear Motors to meet almost any drive problem.

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OUTSTANDING FEATURE of this Allis-Chalmers pump is a new automatic spring valve that provides fast, smooth transition from priming or vacuum pumping to straight centrifugal action.

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Ideal for loading and unloading tank cars, barges, transport trucks, and bulk storage tanks, the new Allis-Chalmers type A Self-Priming pumps feature fast priming action, reduced maintenance, compactness, and portability.

Allis-Chalmers Self-Priming pumps are available in five sizes—from 1½ x 1½ to 4 x 4 . . . Capacities to 500 gpm . . . Heads to 300 ft . . . Automatic primer feature effective for suction lifts up to 25 ft.

For more information on Allis-Chalmers products for the Petroleum Industry, write ALLIS-CHALMERS, MILWAUKEE 1, WIS.

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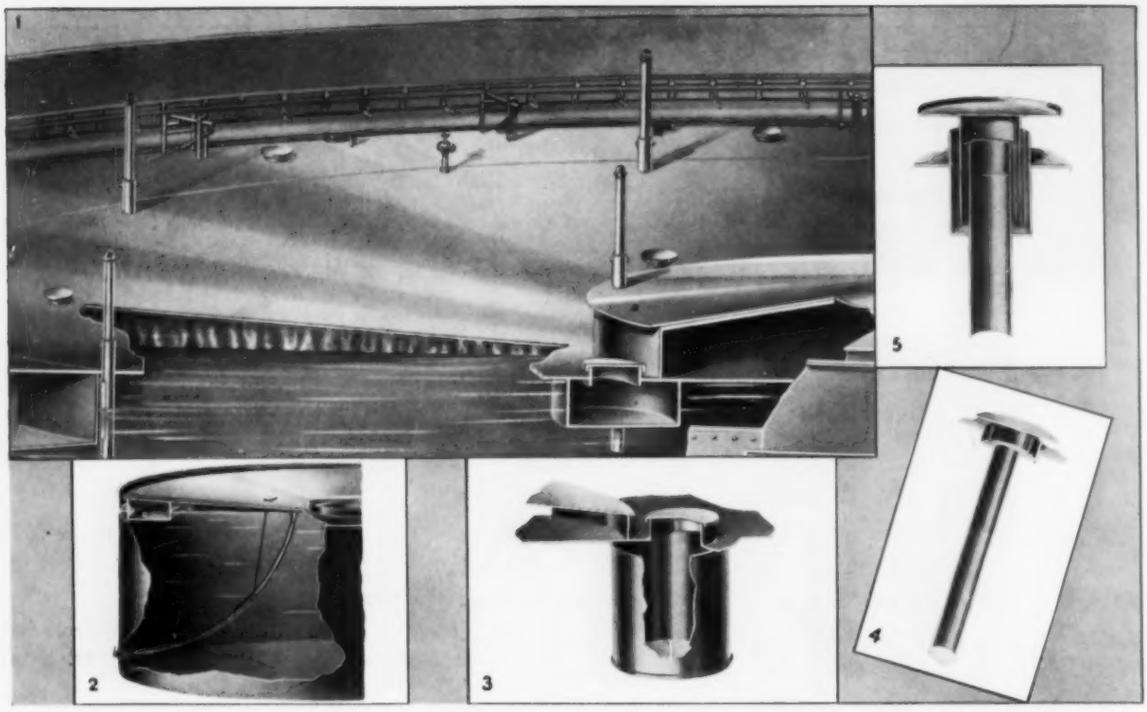

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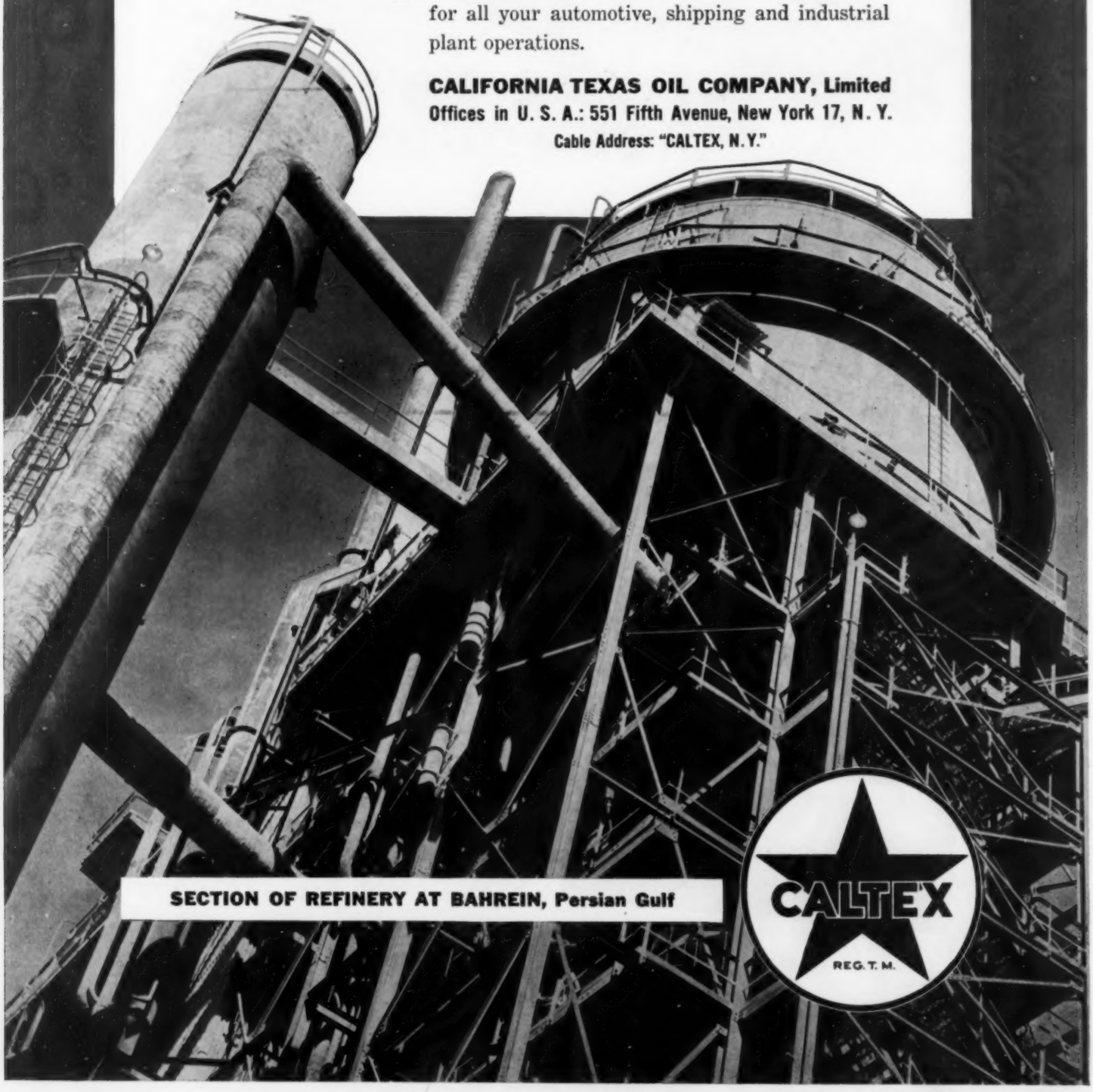

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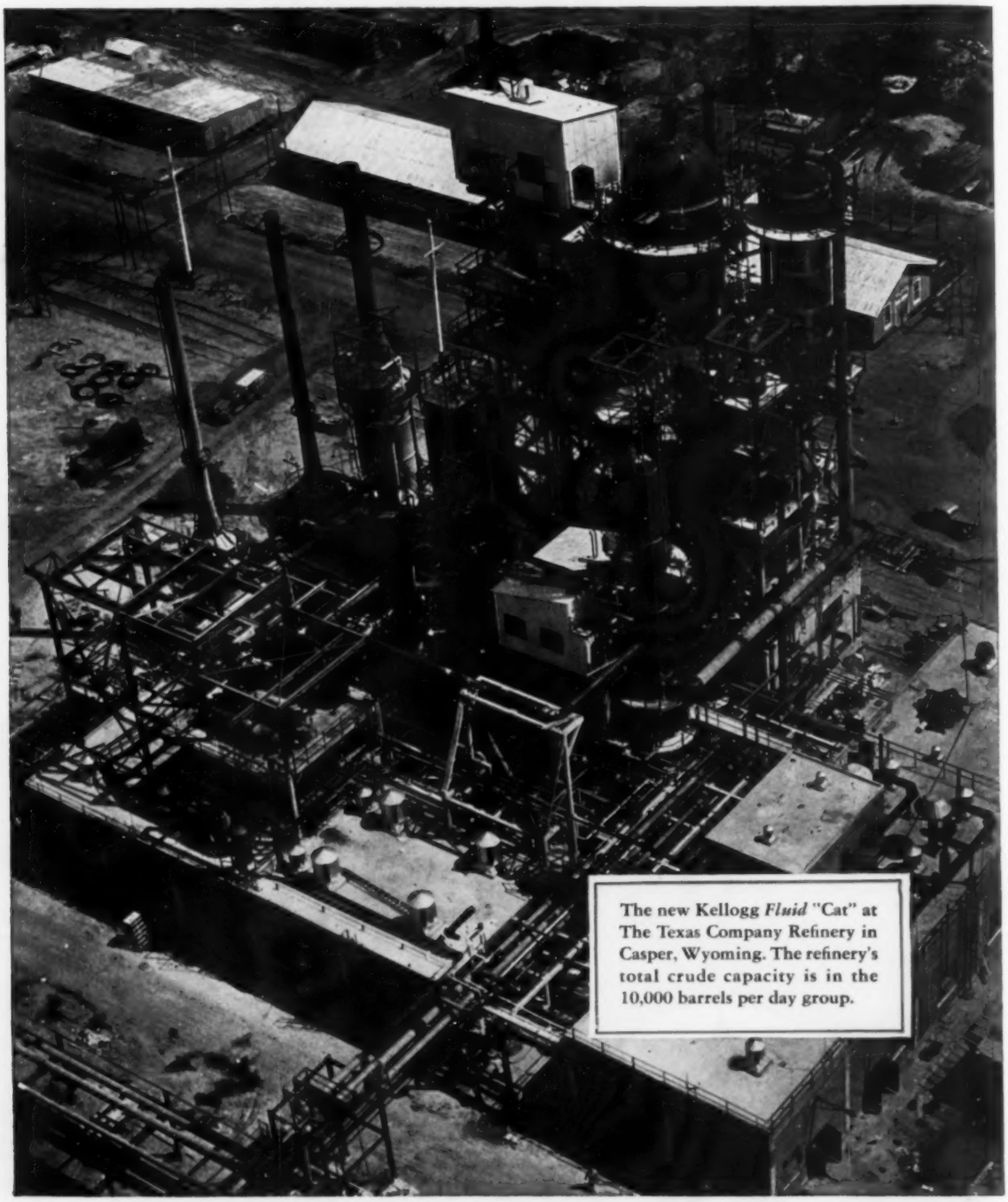

The new Kellogg *Fluid* "Cat" at The Texas Company Refinery in Casper, Wyoming. The refinery's total crude capacity is in the 10,000 barrels per day group.

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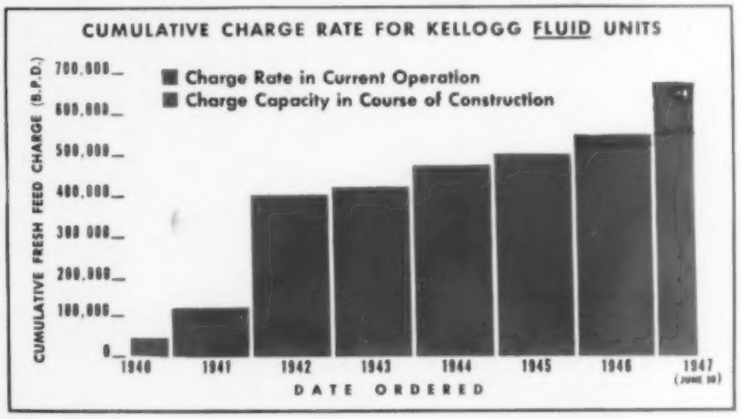

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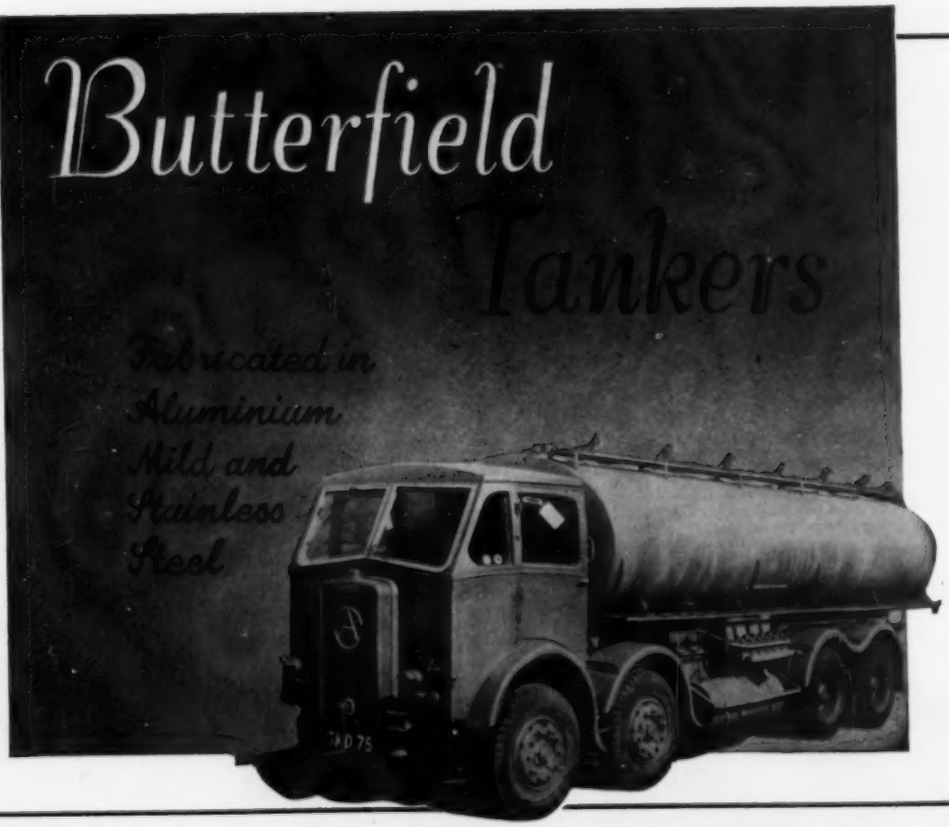

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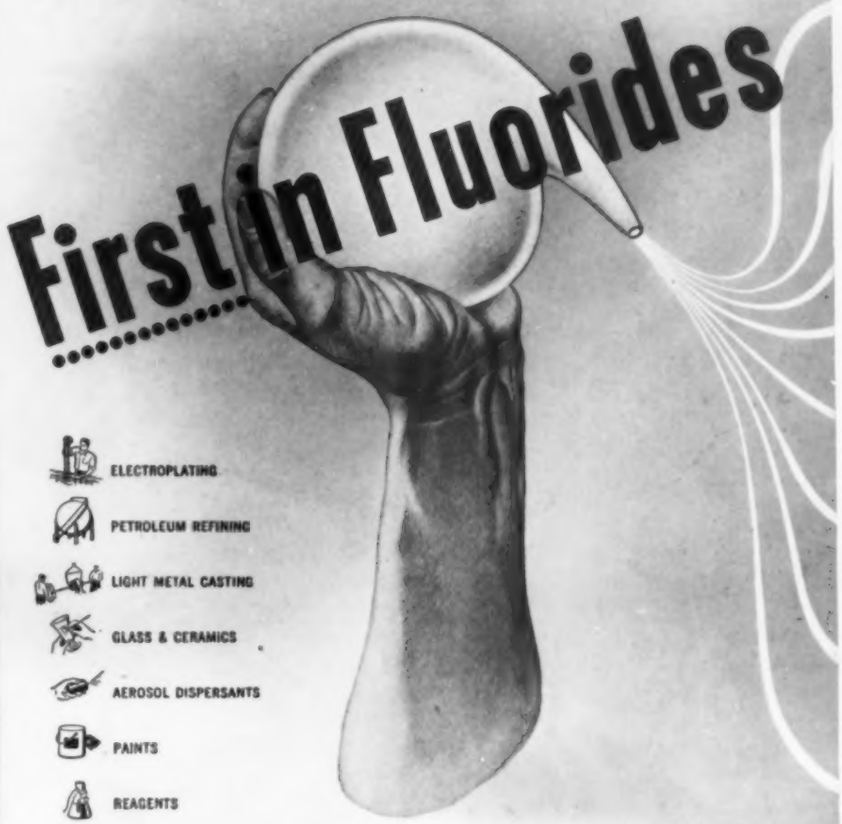

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Ferric Fluoride
Lead Fluoride
Magnesium Fluoride
Nickel Fluoride
Strontium Fluoride
Zinc Fluoride

3 Double Fluorides
Potassium Chromium Fluoride
Potassium Ferric Fluoride
Potassium Titanium Fluoride

4 Non-Metal Fluorides
Boron Fluoride—Diethyl Ether Complex
Sulfur Hexafluoride

5 Acid Fluorides
Ammonium Bifluoride
Potassium Bifluoride
Potassium Polyacid Fluoride "50"
Sodium Bifluoride

6 Alkali Fluoborates
Ammonium Fluoborate
Potassium Fluoborate
Sodium Fluoborate

7 Metal Fluoborate Solutions
Cadmium Fluoborate
Chromium Fluoborate
Cobalt Fluoborate
Copper Fluoborate
Ferrous Fluoborate
Indium Fluoborate
Lead Fluoborate
Manganese Fluoborate
Mercuric Fluoborate
Nickel Fluoborate
Silver Fluoborate
Stannous (Tin) Fluoborate
Zinc Fluoborate

8 Fluorine Acids
Fluoboric Acid
Fluosulfonic Acid
Hydrofluoric Acid
Hydrofluoric Acid, Anhydrous

9 Organic Fluorine Compounds
Ethylidene Fluoride (Genetron* 100)
1,1,1 Difluorochloroethane (Genetron* 101)
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The above products are available either in commercial or experimental quantities. For information contact General Chemical Fluorine Division, 40 Rector Street, New York 6, N. Y.

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it would be easy to stencil everything you'd like to know about its quality and ingredients right on the sack. However, gasoline is generally delivered direct to your gas tank, sight unseen. Oil companies can't label each gallon. That's why they put the familiar yellow-and-black "Ethyl" emblem on their pumps to show that they have improved their best gasoline with "Ethyl" antiknock compound. This famous ingredient, which improves engine power and performance, is made by the Ethyl Corporation, Chrysler Building, New York 17, New York.

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W-S FORGED STAINLESS STEEL PIPE FITTINGS

(Screw-End and Socket-Welding Types)

Now you can save time and money by ordering your stainless steel pipe fittings from Watson-Stillman, because the W-S line is complete in both screw-end and socket-welding types. The following AISI types are offered:

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TYPE 347. Identical to Type 304 with the added advantage of maintaining its fine corrosion resistance properties without heat treatment after fusion welding.

TYPE 316 Similar to Type 347 except that the addition of Moly increases its corrosion resistance properties in a wide variety of services.

3145

Such stainless steel fittings are money-savers because they do not corrode or erode, thus preventing product contamination and assuring long, dependable service.

The complete line of Watson-Stillman Forged Steel Pipe Fittings includes Screw-end and Socket Welding types in Carbon Steel, Carbon-Molybdenum and Chromium-Molybdenum, as well as Stainless Steels. In selecting equipment for particular applications, ask for the advice of a Watson-Stillman expert.

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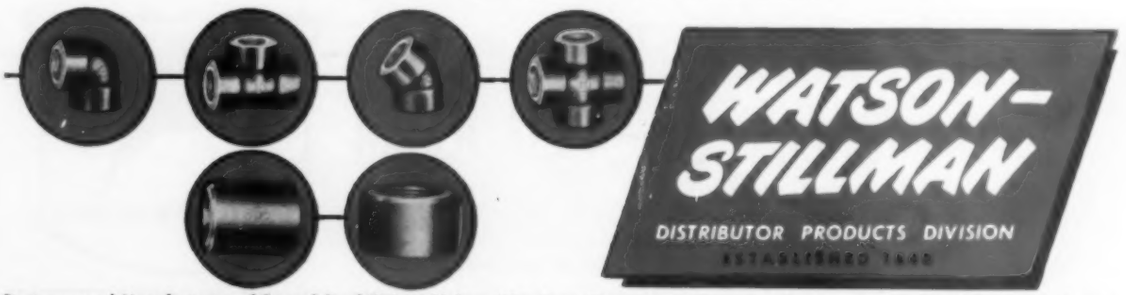
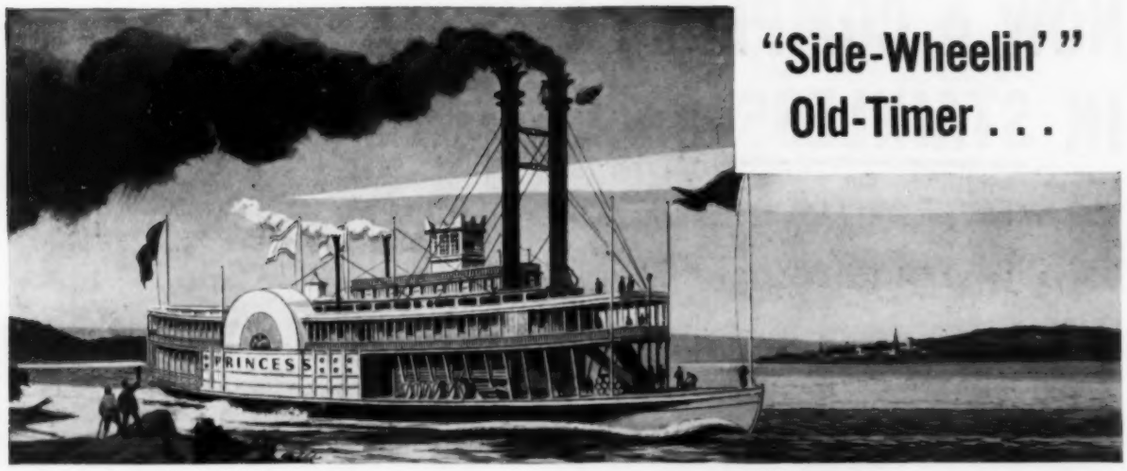


Designers and Manufacturers of Forged Steel Fittings, Valves, Wire Rope Shears, Hand Pumps, Jacks, Pipe Benders and Hydraulic Equipment



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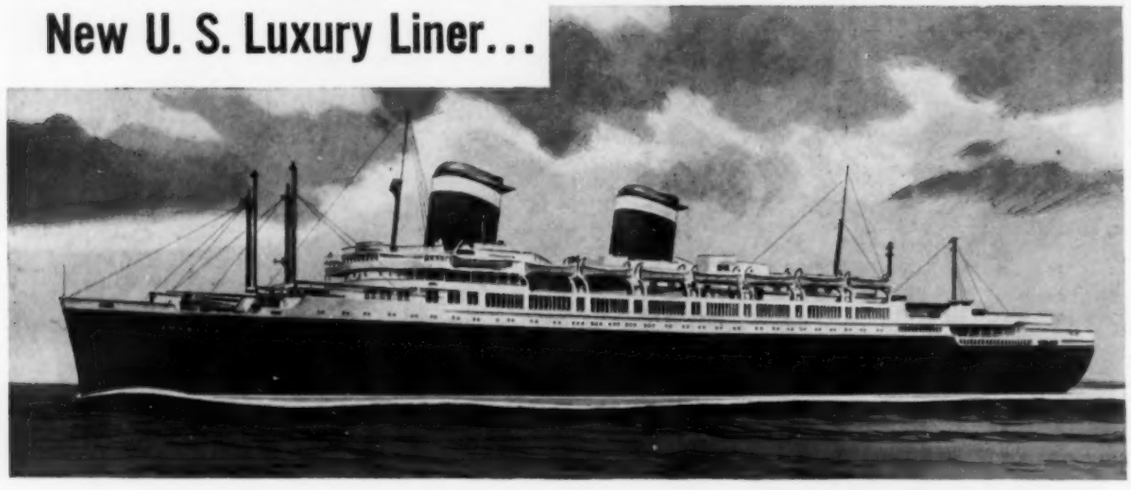
New U. S. Luxury Liner...



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DURING the early 19th Century, the old steamboat was playing second fiddle to the romantic clipper ships.

It was well after the Civil War that engineers began to shake off many limitations of the steam engine. For one thing, they abandoned the old tallow lubrication for a *new petroleum oil* developed in 1876 by the makers of Mobiloil.

This new kind of lubricant made possible greatly increased power, range and safety for steamships.

Working hand in hand with marine engineers and shipbuilders, the petroleum industry has played an important role in the development of the powerful ship engines of today.

For 37 years now, Socony-Vacuum has shared in the triumphs of the world's great blue-ribbon liners.

As new records are set, you may be sure that the petroleum industry and Socony-Vacuum will be on deck with new, improved marine fuels and lubricants to help smooth the way.

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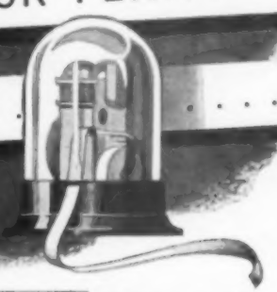
. . . CHANNEL-TYPE CARBON BLACK PLANT . .

. . EUNICE, LEA COUNTY, NEW MEXICO . . . . .

PLANCOR 2253



. FOR SALE OR LEASE .

1. As a whole, for operation at present site;

2. As a whole less two burner units and appropriate accessory buildings and equipment for operation at present site, or—

. . . FOR SALE . . . . .

3. As a whole, except dwellings, for dismantling and removal from site;

4. Two burner units only and their appropriate accessory buildings and equipment for dismantling and removal from site.

If the entire Plancor, except dwellings, not offered at this time, is sold for dismantling and removal from site, the dwellings will be offered at a later date.

War Assets Administration invites proposals for the purchase or lease of Plancor 2253, currently being operated by Panhandle Carbon Company at Eunice, Lea County, New Mexico.

. DESIGNED CAPACITY . .

Approximately 15,000,000 pounds of carbon black per year.

. BUILDINGS & FACILITIES . .

Gas Desulphurization (Treater) Plant, designed capacity, 30 million cubic feet of gas per day. Gas Supply Line. 4 Burner Units, each consisting of 42 Burner Houses, 12′ x 160′ x 9′. Processing, storage and miscellaneous accessory buildings and equipment. Dwellings, 4 at Treater Plant Site, 14 near Carbon Black Plant Site. Total, all buildings, approximately 357,948 sq. ft.

. . DELIVERY STATUS . .

Panhandle Carbon Company now operates this facility under an interim lease cancellable on 30 days' notice.

. . GAS SUPPLIES . . .

Gas is now being supplied by Phillips Petroleum Company under a contract with the present lessee, that runs through December 31, 1949.

Permits for use of natural gas in the manufacture of carbon black are issued by the Oil Conservation Commission of the State of New Mexico.

A prospective lessee or purchaser for operation of all or part of the Plancor at its present location should make his own arrangements to obtain necessary gas supplies.

. . SEALED BIDS . . . . .

Your sealed proposals on Standard Bid Forms will be received by War Assets Administration, Office of Real Property Disposal, 728 Fifteenth Street, Denver, Colorado, until 2:00 P.M., M.S.T., September 17, 1947, at which time all proposals will be publicly opened and read. Credit terms may be arranged. War Assets Administration reserves the right to reject any or all proposals. For a more detailed description of this property and for Standard Bid Forms write:

WAR ASSETS ADMINISTRATION
OFFICE OF REAL PROPERTY DISPOSAL

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DOUBLE COUPLER

BURTON'S
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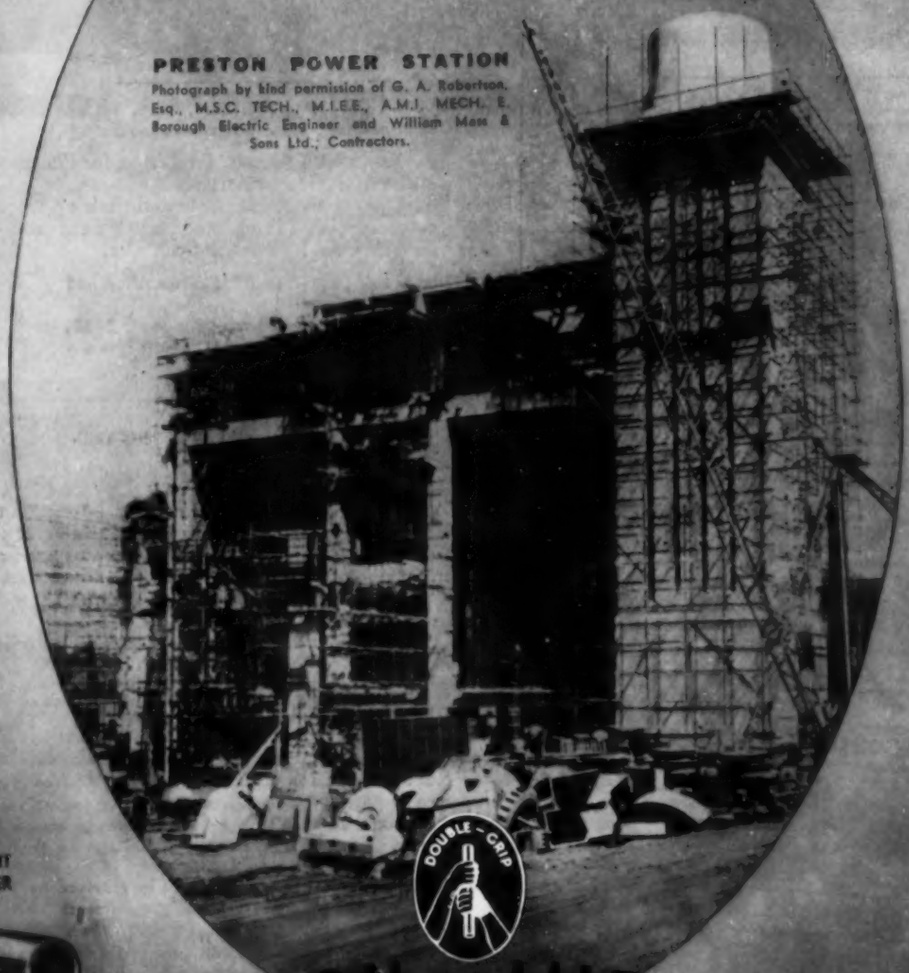
STEEL SCAFFOLDING
FOR SPEED, SAFETY & ECONOMY

BURTON'S PATENT
SWIVEL COUPLER

PRESTON POWER STATION
Photograph by kind permission of G. A. Robertson, Esq., M.S.C. TECH., M.I.E.E., A.M.I. MECH. E. Borough Electric Engineer and William Moss & Sons Ltd., Contractors.



BURTON'S PATENT
PUTLOG COUPLER

BURTON'S PATENT
COMBINED JOINT
PIN AND COUPLER

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Telephone: Abbey 6983/3 Telegrams: Dubelgrip, Sowest, London

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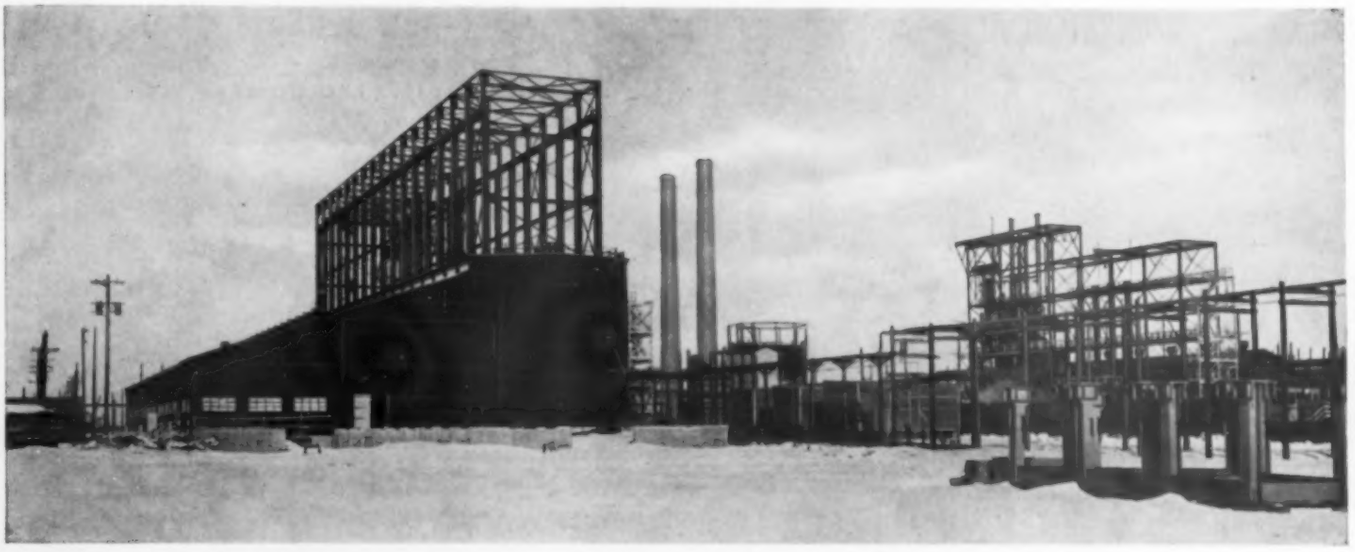

When selecting an organization to design and build a heavy chemical plant, by all means exercise the same discretion as you would in choosing a surgeon . . . trust your dollars as you would your life to *experience* and *skill*. ‹ › Chemico is fully qualified on these counts for Chemico has built over 600 sulfuric acid, synthetic ammonia, synthetic methanol and other heavy chemical plants during the last thirty-three years. Because of this experience Chemico is able to fully guarantee the performance and efficiency of its installations.

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"Standard Oil Company (New Jersey) is increasing substantially its activities and investments abroad as well as in this country. These are practical demonstrations of our confidence that American enterprise can help meet the needs of people everywhere and thereby serve the cause of lasting peace."

From the Annual Report for 1946, Standard Oil Company (New Jersey)

STANDARD OIL COMPANY (NEW JERSEY)

AND AFFILIATED COMPANIES

Part of a distillation unit in Texas. New facilities in 1946 required $278,789,000 capital expenditures by Standard Oil Company (New Jersey) and affiliates.

2447

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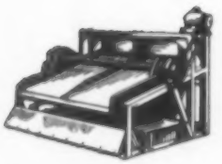
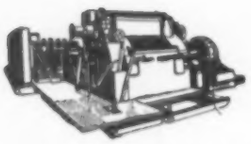


MUD SCREENS



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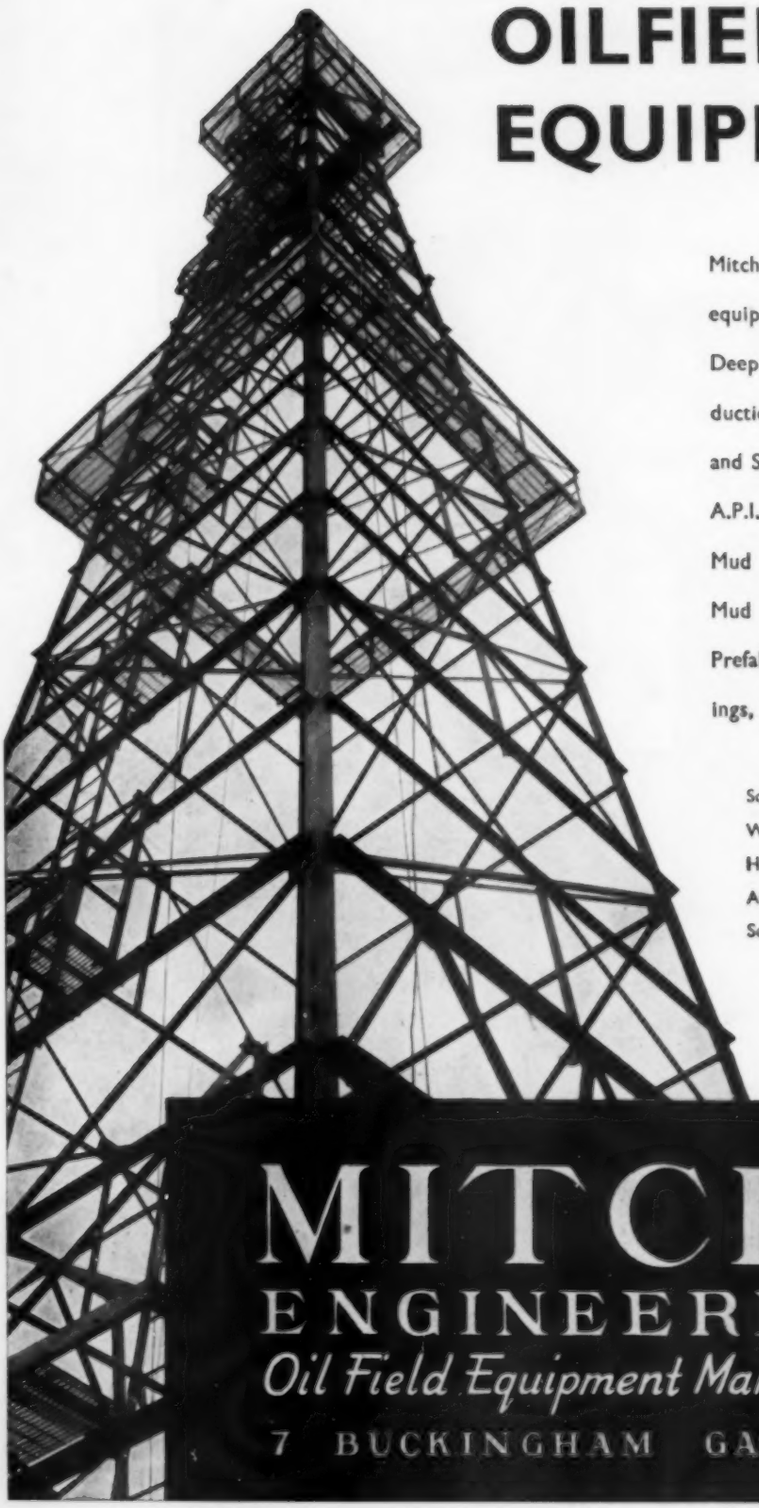
Mitchell Petroleum equipment includes Deep Well and Production Oil Derricks and Substructures to A.P.I. Specifications, Mud Screens and Mud Slush Pumps, Prefabricated Buildings, Boilers.

Sole Concessionaires for Wilson Well Servicing Hoists for Europe, Africa, Australia, and South America.



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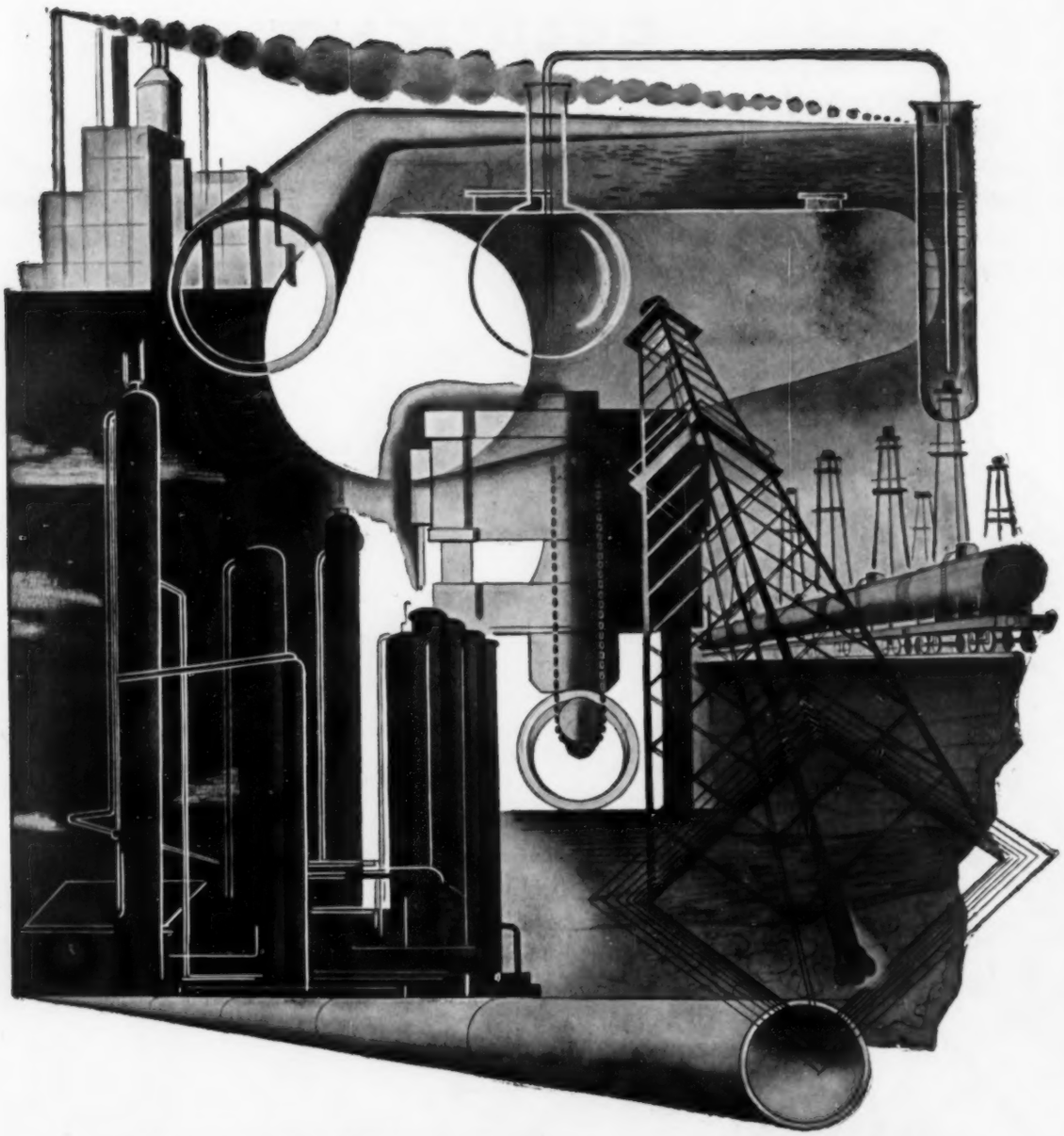

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● Oil field operators everywhere are enthusiastic about the rugged International TD-14 Diesel Crawler tractor. Statements like, "We're mighty proud of our TD-14's—they're highly satisfactory," and "I had no maintenance at all in two years of operation," are common.

International TD-14's are just right for oil field work. They're compact and easy to handle—ideal for slush pit work. Yet they pack plenty of power to skid derricks and spot heavy equipment.

Best of all, these tractors can be depended on to keep going hour after hour, day after day, when time on the job is of top importance. You can cut your down-time to the bone with Internationals—and that means profits in your pocket.

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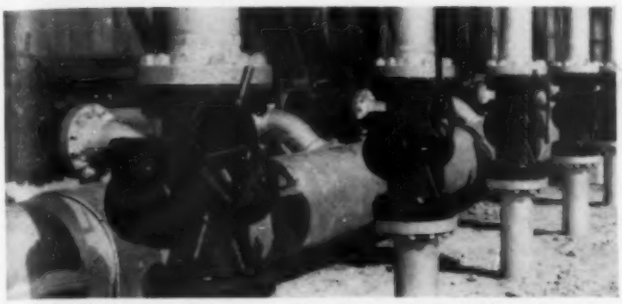
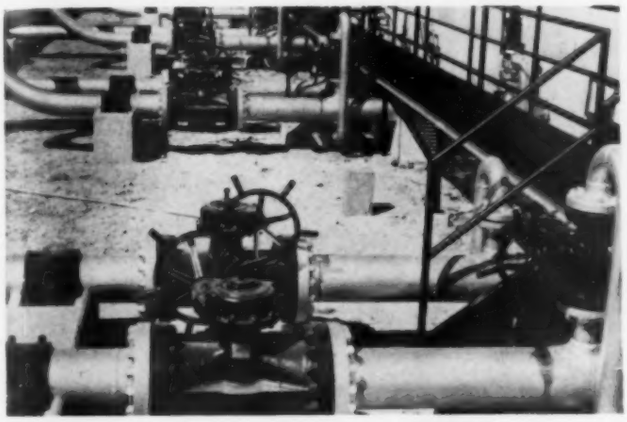
Lubrication IS the secret of longest valve life



Audco-Nordstrom valves on gas lines in a natural gasoline absorption plant.



Audco-Nordstrom valves at a compressor station.

Audo-Nordstrom valves on line in a manufactured gas plant.

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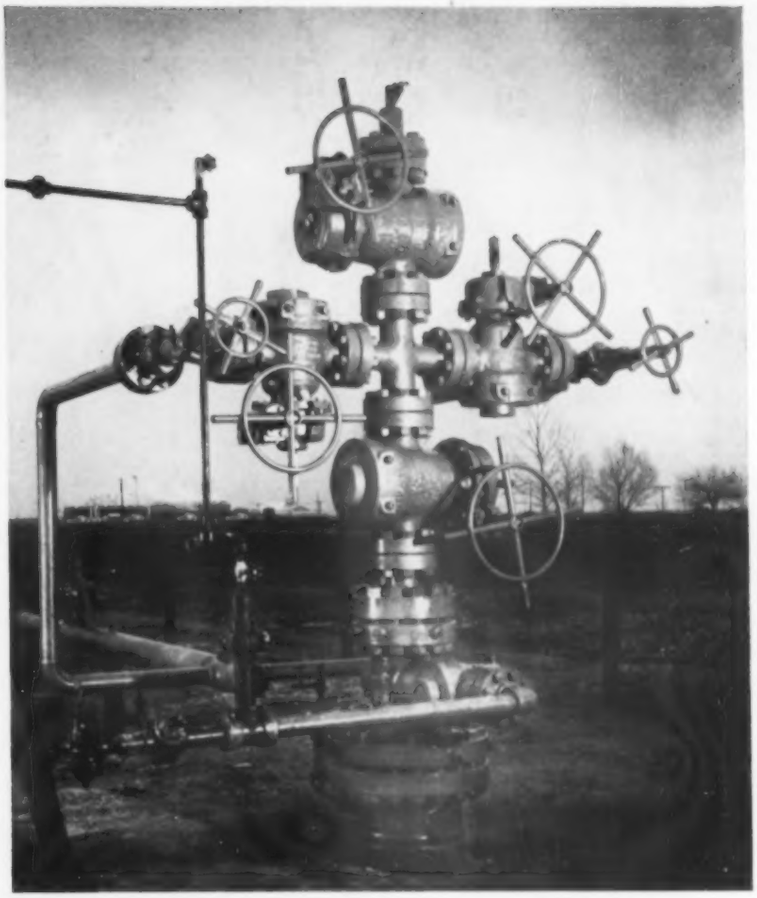


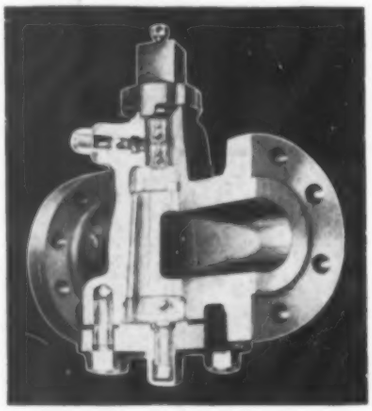
A modern Christmas tree fully equipped with high pressure Hypreseal valves.

AUDCO-NORDSTROM

BRITISH AMERICAN

pioneered and perfected lubrication in valves.

A plug valve is the simplest of all controls. A plug valve with *lubrication* overcomes the tendency of the plug to stick. In Audco-Nordstrom plug valves, lubricant also accomplishes several other desirable purposes. It is pressurized by turning a simple lubricant screw. The hydraulic lubricant pressure is transmitted through grooves in the plug and body around the ports. This provides an effective leakproof seal. In the high pressure Hypreseal type a triple seal is provided. Corrosion and erosion are resisted. Valves made of special alloys are furnished for highly corrosive services. A complete range of sizes are available for all petroleum production, transmission and refinery services.



Hypreseal type.

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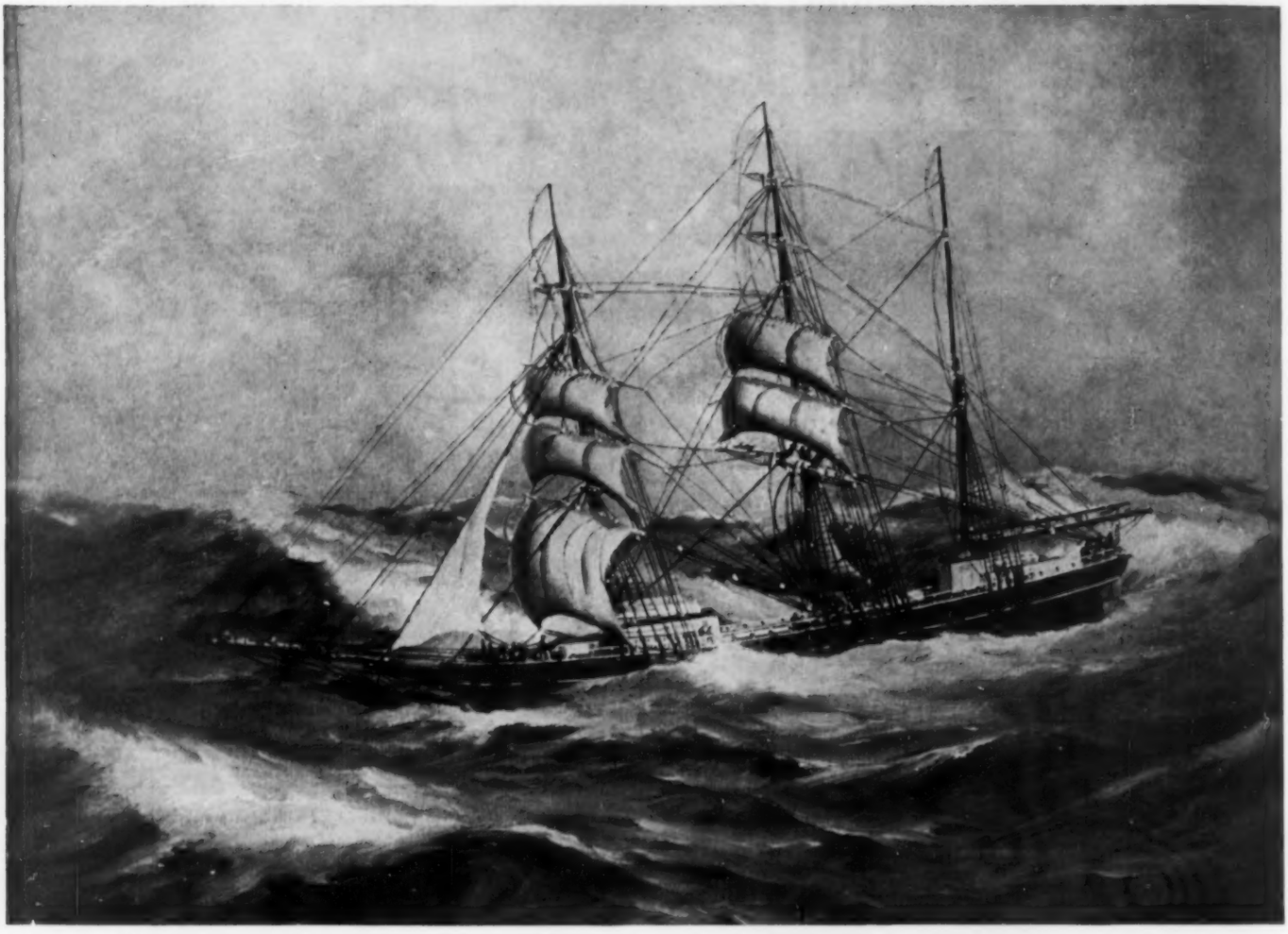
LUBRICATED VALVES



The Barque Georgietta, 459 tons, "running down her easting" in the Indian Ocean, en route to Australia from New York, in the "eighties", carrying case oil.

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Standard-Vacuum Oil Company and its affiliated companies pioneered the distribution of petroleum products in Australia, New Zealand, the Far East, India, South and East Africa. For over 50 years we have marketed high grade petroleum products in those areas.

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. . . "sweet to the Doctor"

but

in modern refining . . . . . the Doctor test tells only part of the story.

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In "Dollars and cents", such excessive T. E. L. consumption means decreased profits of 7.56 cents per barrel of finished gasoline.

SOLUTIZER TREATING FOR T.E.L. SAVINGS

The IMPROVED SOLUTIZER PROCESS removes these sulphur compounds in their original state as "mercaptans". Doctor sweetening merely converts these mercaptans to octane-depressing disulphides.

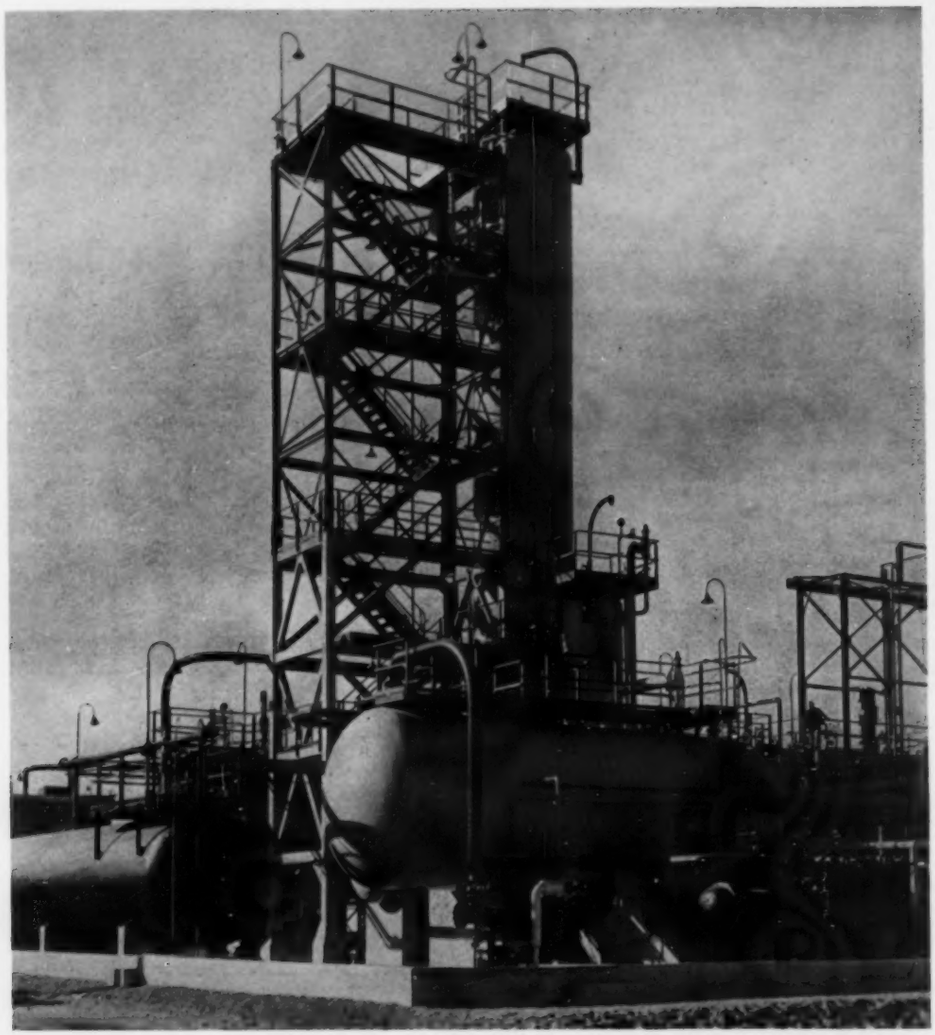
SOLUTIZER operating cost is equal to and frequently less than Doctor sweetening cost and savings in tetra-ethyl-lead, in some cases, are so marked that an **investment pay-off in less than a year is possible.**

Simple laboratory testing of your "sour" gasoline will disclose approximate T. E. L. savings thru SOLUTIZING. For further information address Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.

FOSTER WHEELER

Removing Mercaptans from

27,000 barrels per day of Sour West Texas Gasoline



This unit, recently placed in operation by a major oil refiner, makes possible the finishing of 27,000 barrels per day of gasoline components by extractive removal of mercaptans.

This operation permitted the refining of sour crudes in a refinery substantially limited to sweet crude processing.

A large saving in Tetra-ethyl-lead was realized as a result of the reduction of mercaptan and disulphide-sulphur content.

(Designed and constructed by the Foster Wheeler Corporation, 165 Broadway, New York.)

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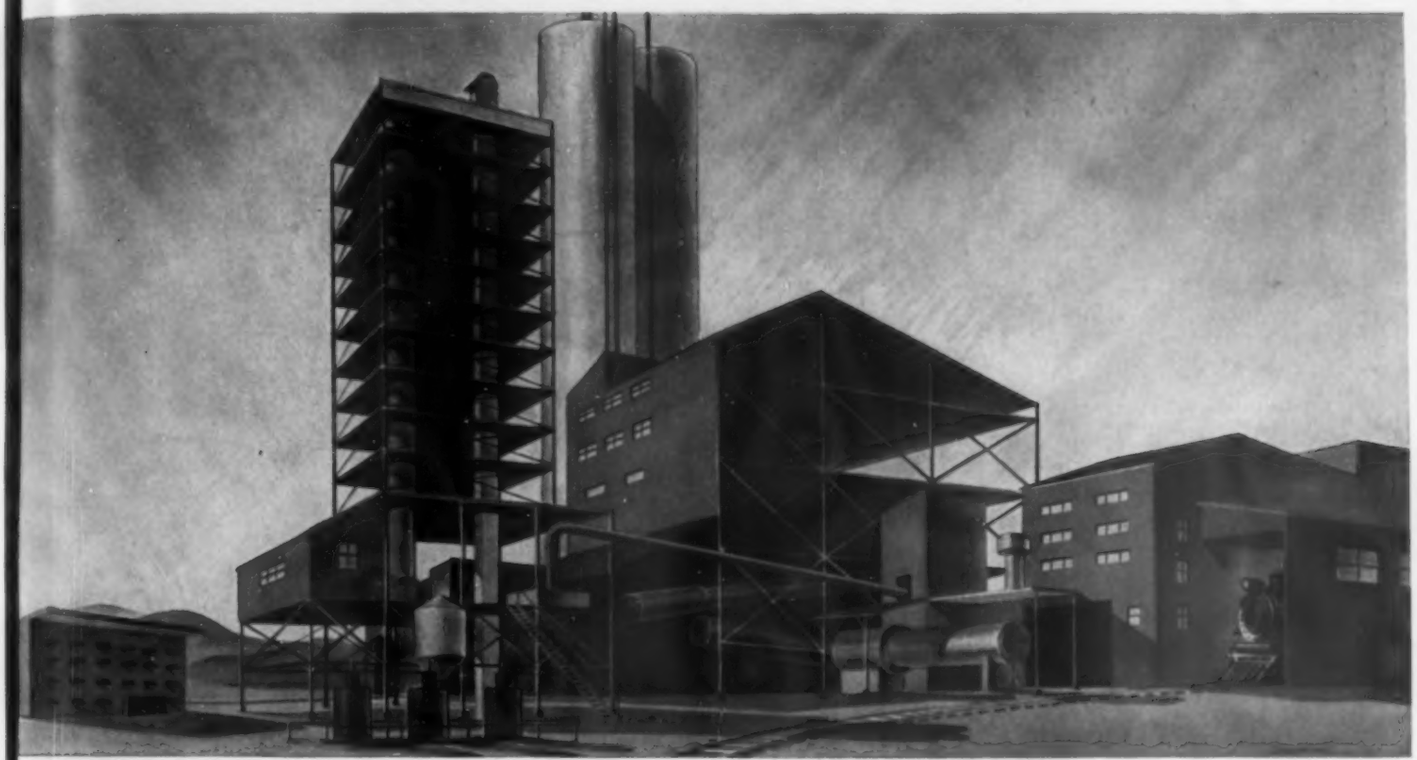
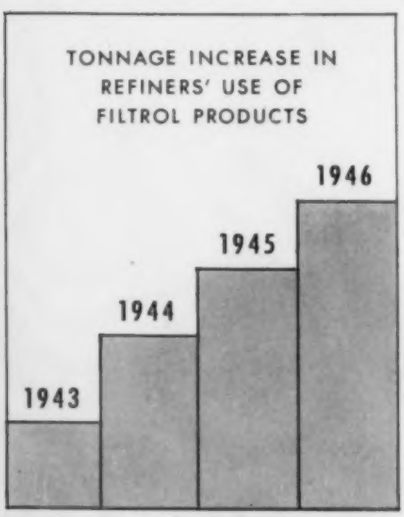
FOSTER WHEELER

built to meet increasing preference



devoted to producing better Filtrol products



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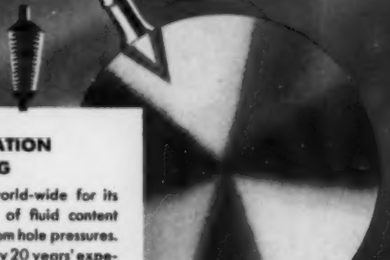

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This Month's Cover

Night view of Humble Oil & Refining Company's E. L. Milo No. 10, deep test in the Tomball, Texas, field. Photo by Bubley for Standard Oil Co. (N.J.)

The economics of TCC... AS APPLIED TO 16 REFINERIES

Here are 16 refineries, located in 9 states and varying in crude capacity from 3,000 BPD to 25,000 BPD. Houdry engineers analyzed the over-all operations of each of these refineries and projected the addition to it of T C C cracking.

The true measure of the earning power of T C C equipment is reflected in the low differential between the by-product cost of gasoline and the cost of crude. The resulting increase in earnings makes it possible for any of these refiners to retire T C C's low capital cost within a relatively short period of time.

Ask Houdry to demonstrate the profits from T C C installation in your refinery.

SUMMARY OF ECONOMICS FOR VARIOUS REFINERY PROJECTS

Refinery Analysis No.	Crude Capacity BPCD	Gasoline BPCD	Distillate Fuels BPCD	Residual Fuel BPCD	ASTM Octane No.	TEL Ccs/Gal.	Crude Cost ¢/Gal.	By-Product Cost of Gasoline ¢/Gal.	Differential ¢/Gal.	Payout in Years
1	5,000	2,893	1,185	688	83.0	1.9	3.8	4.6	0.8	1.4
2	5,000	2,848	600	1,428	83.5	1.3	3.0	5.0	2.0	2.2
3	5,000	3,281	1,239	286	77.5	1.7	4.2	5.1	0.9	3.5
4	3,000	1,206	870	914	79.0	1.3	4.6	4.9	0.3	2.3
5	6,000	3,673	1,080	1,036	77.5	0.7	3.2	4.2	1.0	3.7
6	4,000	2,842	320	604	79.0	0.7	3.2	4.7	1.5	3.6
7	6,000	3,992	.....	1,566	82.5	0.9	3.0	5.1	2.1	2.9
8	4,000	2,610	400	753	78.0	0.5	3.1	4.6	1.5	2.9
9	12,000	7,787	1,800	1,602	81.0	1.5	2.8	4.0	1.2	1.1
10	5,330	3,812	.....	1,032	80.5	0.5	2.9	4.5	1.6	3.3
11	22,500	15,562	2,250	3,004	80.0	0.6	3.9	5.1	1.2	2.3
12	12,000	5,969	1,025	4,612	82.0	1.1	2.5	3.6	1.1	2.5
13	10,000	5,110	3,963	574	78.0	0.5	3.5	3.9	0.4	1.8
14	3,500	1,764	525	1,069	80.0	1.1	3.1	4.7	1.6	2.2
15	9,000	4,663	2,375	1,662	76.0	0.6	4.6	5.1	0.5	2.2
16	6,750	4,473	1,991	783	81.5	1.5	3.9	4.7	0.8	1.7

HOUDRY PROCESS CORPORATION
25 Broad Street, New York 4, N. Y.

HOUDRY CATALYTIC PROCESSES

EXPORT PROBLEM OF THE UNITED STATES

REPORTS of a tight situation in various sectors of the market have led to much confusion among the users of petroleum products in the United States. Based only upon local and temporary conditions, they have been magnified into predictions of a nation-wide shortage involving the imminent return of gasoline and fuel oil rationing. Sensational stories about alleged huge shipments of oil and oil industry equipment have brought upon Congress excited demands for the embargo of all such exports.

Members of the oil industry have explained patiently that there is nothing like an oil famine in existence or in prospect. They have quoted statistics to prove that, despite the unexpectedly sudden upswing in the consumption of petroleum products since the close of the war, production has kept pace with this increase. They have pointed out that such difficulties as arise are due not to a dearth of oil, but to inadequacy of facilities to deliver products into some marketing areas rapidly enough to meet demands of extraordinary proportions. But, as is well known, a sensational explanation gets a more popular reception than one that is commonplace.

In reality the postwar progress of the oil industry is remarkable, considering the many difficulties encountered. Faced by tremendous demands and hampered by enforced slowdowns due to strikes steel mills were unable to process promptly the structural materials and tubular goods asked for by oil companies and their suppliers. In consequence the construction of projected pipelines for conveyance of crude to refineries and of products to distributing centers was delayed, and additions to refining capacity had to be postponed. These two factors have contributed directly to the uncomfortable supply situation in parts of the Midwest which has forced some companies serving that territory to put a temporary lid on deliveries to their distributors. Yet these limitations are not drastic enough to cause serious inconvenience to consumers, being designed only to assure equitable treatment by restricting wholesalers to the same quantities they received in 1946. Reasonable forbearance on the part of consumers in the sections affected during the season of heaviest demand is all that is required, while the expansion of transportation and manufacturing facilities on which oil and oil equipment companies are concentrating their efforts goes forward with all possible speed.

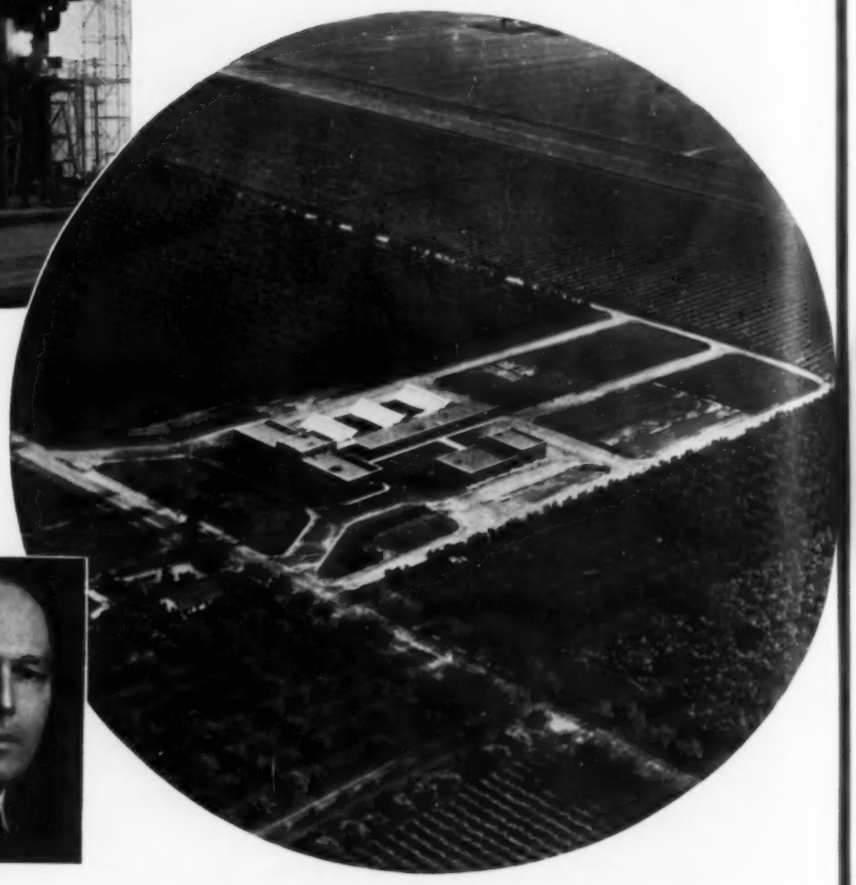
While the effect of exports, either of oil products or oil industry equipment, upon the domestic situation has been unduly magnified in recent discussion, it is true that the United States has an export problem to deal with in the matter of petroleum. Although the demand for oil products has risen sharply among American consumers, the increase in demand in other countries has been even greater proportionally. At the same time the means of satisfying these outside requirements have been diminished by the widespread destruction of refining, storage and distributing facilities during the war. America is not called upon to sacrifice its own necessities in order to relieve predicaments which it did not create, but Americans have voluntarily accepted the obligation to aid economic recovery abroad. To bring this about, nothing that can be named is more necessary than the principal products of petroleum. Nothing is more essential to the restoration of international trade on which high productive activity and full employment in the United States are admittedly dependent. Participation in world industrial recovery, therefore, involves the shipment overseas of petroleum products to supply, at least in part, requirements that are most essential, or, alternatively, the shipment of machinery and supplies that will help to reestablish production and processing abroad.

Recently a committee of the National Petroleum Council advanced the suggestion that one means of relieving export pressure upon American oil suppliers would be to permit American refining companies operating abroad to obtain the materials and equipment needed to repair their properties. This brought about much criticism. Actually the committee was protesting the course, which it attributed to export control authorities, of favoring permits to governments and companies not contributing to the restoration of war-damaged industry rather than to American concerns and friendly countries that are in a position to make such contributions.

Throughout the history of the oil industry, Americans have led the way in the development of petroleum resources both at home and abroad and in the manufacture and improvement of equipment which has come into use all over the world. They can hardly afford now to become isolationists so far as this one industry is concerned, especially as the present trend demonstrates a growing interdependence of oil operations wherever located.

ORGANIC CHEMICALS FROM PETROLEUM

Gas reform unit of Shell Chemical Corporation's plant for the manufacture of synthetic ammonia at Pittsburg, Calif.



Shell's experimental farm and agricultural laboratories at Modesto, Calif.

With the great expansion in the manufacture of chemicals from petroleum and the constant development of new chemical products from this source, the relationship between the manufacture of many important chemicals and the processing of petroleum has become steadily more intimate. In fact the dividing line is disappearing as petroleum chemistry assumes a more and more important place in the general pictur. A study of this development, therefore, becomes of interest to oil men everywhere, and for this reason WORLD PETROLEUM is presenting herewith the story of Shell Chemical Corporation, which pioneered in this field and has been a leader in many of its important developments, as representative of th progress that has been made and that is of rapidly increasing commercial significance.

J. Oostermeyer, president, Shell Chemical Corp.

A PROGRESS report on the industry of synthetic organic chemicals derived from petroleum can now be presented without resorting to the enumeration of spectacular facts which usually characterizes discussions of new, fast-growing enterprises. The petroleum industry, through its various trade publications, has kept abreast of developments in the relatively new field of petroderivatives, and there are but few interested in oil today who are not aware of its potentialities as raw material for the manufacture of organic chemicals.

The latest figures reported by the U. S. Tariff Commission on synthetic organic chemicals set the 1945 production of isopropyl alcohol from petroleum at nearly 500 million gallons. The isopropyl alcohol manufactured from petroleum in 1936 totaled 140 million gallons. This significant trend evidenced in a short period of years applies to the industry in general—an industry that during 1945 consumed 3.3 billion pounds of petroleum-derived raw materials. Figure 1 shows graphically the combined yearly production of isopropyl, ethyl and secondary butyl alcohols and their derivatives. These basic materials and their production record are representative of synthetic organic chemical manufacture in the United States.

The slope in the production curve for the period preceding World War II is a measure of the growing acceptance of synthetic chemicals in the industrial market for these relatively normal years.

Advent of the war did not noticeably affect the production slope of the few well-established synthetic chemicals but rather changed their major fields of application. Acetone was used as raw material for explosives in preference to its role as solvent for rayon production; isopropyl alcohol added to its applications the job of supplementing the short ethyl alcohol supply; plastics from petroleum derivatives were used in bomber noses rather than for non-essential civilian needs. The war, however, stimulated the production of many new synthetic derivatives, as the American government looked to petroleum chemicals for synthetic rubber intermediates, high-octane gasoline additives and many other products essential to the successful prosecution of the war. Figure 2 illustrates the production course of two important war materials—toluene and butadiene manufactured from petroleum.

The end of hostilities brought no sharp decrease in the overall production of petroleum-derived synthetic materials. While many war plants ceased operation, extensive programs delayed by the war were resumed and production of new petroleum derivatives was initiated. Such, briefly, is the rapid growth and present status of the new industry which during the past decade has engaged the attention of many of the petroleum and

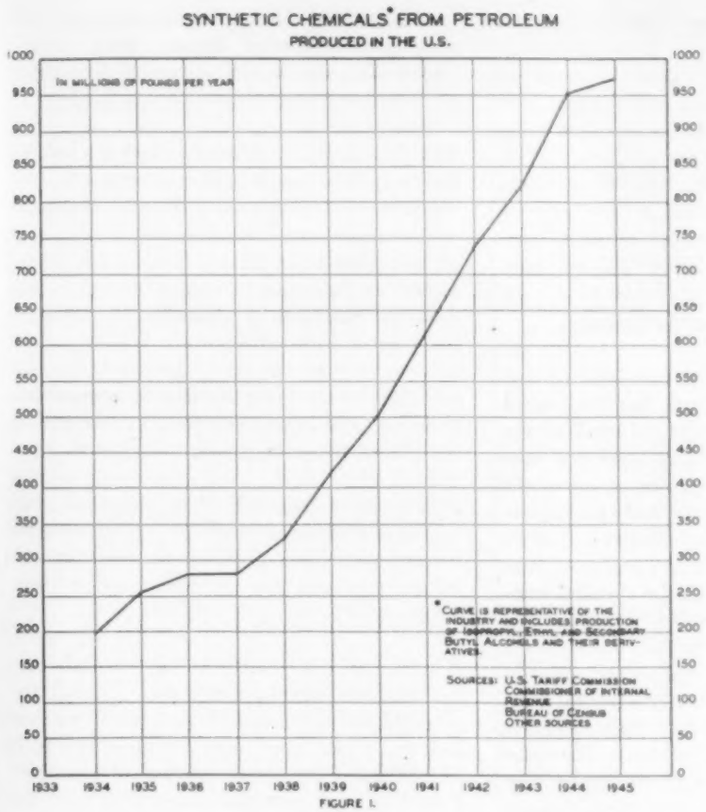


FIGURE 1.

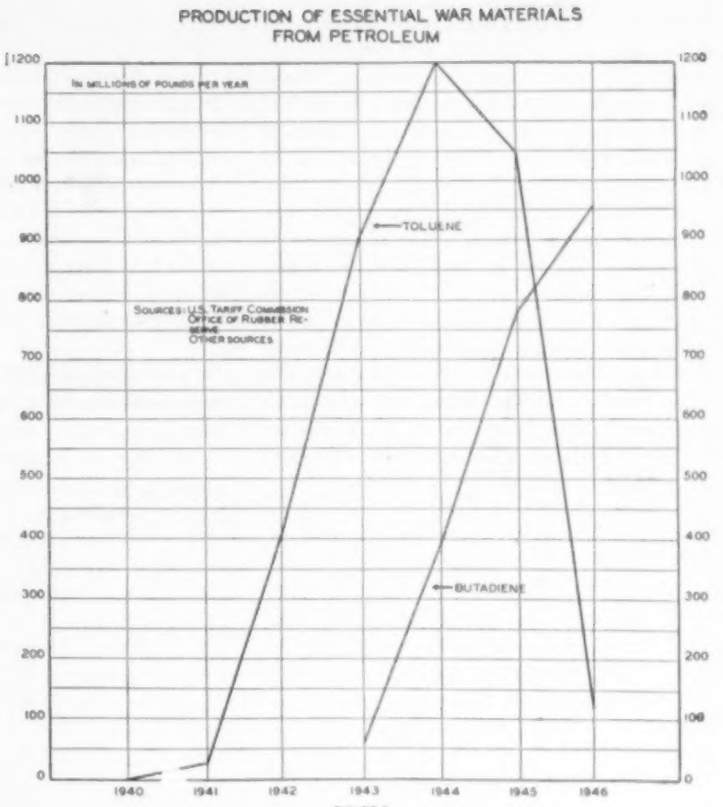


FIGURE 2.

chemical companies in the country. This interest has materialized since 1945 into an unparalleled expansion which involves an expenditure of over 300 million dollars.

It can be generally said that the manufacture of industrial organic chemicals, while essentially related to oil refining, is characterized by the higher degree to which the following qualities apply to its operations:

(1) High initial investment
(2) Technical processes involving many steps from raw material to finished product
(3) Narrow product specification ranges
(4) Rapid obsolescence of equipment and processes
(5) Necessity of developing markets for secondary products.

Correspondingly, an organization undertaking the manufacture of chemicals from petroleum must comprise within its boundaries financial stability, availability of cheap raw materials, extensive experience both in oil refining and in the production of chemicals, highly trained technical personal, ample research facilities and an efficient modern chemical marketing department. For meeting these rigorous requirements, which essentially call for the combined resources of the chemical and petroleum industries, American ingenuity has devised several workable arrangements:

(1) A chemical plant owned and operated by a chemical company located near a large petroleum refinery with which a long-term contract for the supply of raw material is arranged.

(2) A chemical plant owned and operated by a chemical company located within economic distance of a petroleum refinery region and purchasing raw materials on short-term contracts from oil refineries.

(3) A chemical company, operating one or more chemical plants, created as a jointly-owned subsidiary by a chemical company and a petroleum company.

(4) Relatively independent chemical division or wholly owned subsidiary of a petroleum company, created for the specific purpose of manufacturing and marketing chemicals from petroleum.

There are perhaps other types of petroleum chemical manufacturing plants, but the majority will be found to fall into one of the four categories outlined. An example of the last and a pioneer in the field of petroleum chemicals is the Shell Chemical Corporation. The remainder of this article will be devoted to a detailed discussion of this organization as typical of the industry.

Shell Chemical Corporation, known then as Shell Chemical Company, was formed in 1929 as a logical complement to Shell Oil Company, Inc., and Shell Development Company. Shell Chemical provided a useful outlet for an oil company intent on efficient operation and an associate research company with a considerable storehouse of knowledge in the field of petroleum chemistry. In general it may be said that Shell Chemical utilizes raw materials which Shell Oil is able to furnish and operates processes which have been advanced by Shell Development.

A brief analysis will show that within these three organizations are comprised all the qualifications outlined above as requirements for successful operation in the synthetic industrial chemical field.

Shell Oil contributes years of experience in the production and refining of petroleum, abundant supply of raw materials from its wells, refineries and catalytic cracking units throughout the country and the stability attending a large organization.

Shell Development contributes the results of research, both basic and applied, in the fields of petroleum and petroleum-derived organic chemicals. It develops processes through the laboratory and pilot-plant stages and helps determine their commercial potentialities.

Shell Chemical contributes experience and personnel trained in chemical operations, constructs and operates commercial plants and maintains a nation-wide marketing organization equipped to render the special services demanded of the chemical industry.

From its inception the history of Shell Chemical is the history of petroleum as a chemical raw material. The commercial utilization of natural gas and refinery cracked gases has been its dual objective. In 1930 Shell Chemical built a nitrogen fixation plant near Pittsburg, California, 30 miles northeast of San Francisco, a location since known as "Shell Point." The site of this first plant was chosen because of the advantages it presented in natural gas availability, rail and water transportation and the proximity of an agricultural market for which the plant's main products — ammonia and ammonium sulfate — were primarily intended. This plant was the first synthetic ammonia plant based on natural gas in the United States and one of the few in the country previous to the government-sponsored construction program of World War II.

In pursuit of the second object, the utilization of refinery cracked gases, the company built, also in 1930, an alcohol-from-petroleum plant adjacent to the Martinez, California, refinery of Shell Oil. The plant was originally designed for the production of secondary butyl alcohol from normal butylenes, but a year later operations were extended to include the manufacture of tertiary butyl alcohol and methyl ethyl ketone. Paralleling the growth of the industry in general, the Martinez plant was further expanded in 1935 to add the production of isopropyl alcohol and acetone.

In 1936, Shell Chemical completed the construction of its Dominguez, California, plant. This plant, adjoining the Dominguez refinery of Shell Oil near Los Angeles, embodied in its design knowledge gained from the operation of the Martinez plant and added in the next few years diacetone alcohol, mesityl oxide and methyl isobutyl ketone to the list of synthetic alcohols and ketones then produced.

A further effort to utilize waste gases fostered in 1940 the installation of processes for the manufacture of petroleum chemicals at Shell Oil's Houston, Texas, refinery. Among these processes were those intended to increase Shell Chemical's overall production of acetone and isopropyl alcochol. Of special interest, however, was the construction at Houston, finished in the early part of 1941, of the first full-scale butadiene plant in the country. As early as 1940, Ludwig Rosenstein of Shell Chemical, in a paper presented to the American Petroleum Institute, stated: "Also in the stage of semi-commercial development is butadiene, which is of growing interest in connection with the manufacture of synthetic rubber." Ten years of research had crystallized in the commercial venture at Houston. Initially from a small-scale plant at Shell Development's laboratories and later from Shell Chemical's commercial plant at Houston, butadiene was supplied to rubber companies and universities for synthetic rubber research, a research which mushroomed after Pearl Harbor to a government-financed multi-million-dollar industry.

As Shell Chemical's operations expanded and each plant increased its output, futher diversification of chemical products followed. Basic research supplied the processes for secondary syntheses and plants were built for the production of derivatives of the primary products. With the advent of World War II, however, expansion was halted and Shell Chemical, with other companies in the petroleum and related fields, contributed to the organized industrial cooperation which to a great extent was responsible for the winning of the war.

During the war Shell Chemical initiated and completed two major projects for the United States government. In 1942 it undertook for the Rubber Reserve Company the design and construction at Torrance, California, of one of the largest butadiene production and purification units in the synthetic rubber program. Shell's experience with the chemical utilization of low-boiling hydrocarbons enabled the chemical company to contribute considerable "know-how" to the rubber program, and by July of 1943 the 63,000-tons-per-year butadiene plant was in operation. Other petroleum and chemical companies contributed experience in their particular fields of specialization, and within a few years the prewar synthetic rubber production capacity of the United States was expanded 200 times.

In 1943 Shell Chemical was requested to convert the Cactus Ordnance Works, an incomplete synthetic ammonia plant in the Texas Panhandle, to the production of a secret aviation gasoline additive known as C. S. The plant conversion was completed, and its production substantially contributed to the development of new aviation fuels and helped relieve the shortage of 100-octane-plus gasoline over a critical period of the war. In 1945 Shell Chemical built units at Houston for the production of allyl chloride, allyl alcohol and "D-D,"* the last an effective soil fumigant. These products were manufactured from cracked gases by substitutive chlorination, a process which will be discussed further in this report.

With the end of the war Shell Chemical's delayed peacetime expansion program was resumed. Extensions to existing plants designed to increase production and operating efficiencies were completed, and plant construction for manufacture of new products was initiated. This latter phase of the expansion program was concentrated at Houston, Texas. The Houston area presents several advantages to the manufacturer of chemicals: adequate supplies of raw materials, low-cost fuel and relative proximity by land or water to centers of chemical consuming industries. Shell Chemical has augmented or is in the process of augmenting the units of its Houston plant with new ones contributing products to the organic solvents, intermediates and agricultural fields. Among those completed or under construction are plants for the manufacture of methyl isobutyl carbinol, methyl isobutyl, ketone, secondary butyl alcohol, methyl ethyl ketone, ethyl alcohol, glycerin, epichlorohydrin, glycerol dichorohydrin and hexylene glycol.

The glycerin plant at Houston which is scheduled for completion during 1948 is a noteworthy contribution to American self-sufficiency and economy, inasmuch as it supplements the supply of glycerin obtained from fats and oils and will have a stabilizing effect on its availability and market price. The commercial production of this essential material from petroleum has been termed by industry one of the most significant chemical achievements since the fixation of atmospheric nitrogen. The Houston plant will be the first in the United States to operate this process.

Before undertaking a brief discussion of Shell Chemical processes, it might be well to consider the raw materials available to the petrochemical industry: natural gas, petroleum and refinery cracked gases.

Natural gas is a mixture of the lowest-boiling hydrocarbons, essentially methane. Though the principal use of methane from natural gas has been and probably will continue to be as a fuel, its utilization for the production of formaldehyde has been successful since 1928, and its role as raw material for the commercial production of ammonia was pioneered by Shell Chemical in 1931. Through the war years the use of natural gas as raw material was extended to diversified fields; its consumption for non-fuel uses represents even today only a small fraction of its yearly production.

Although the history of commercial petroleum production dates back to the early sixties of last century, little basic research on its chemical constitution was undertaken during the early stages of its development, and for many years petroleum was regarded generally by industry as a combination of a few marketable fractions and many useless, undesirable by-products. Although sporadic research was conducted earlier and utilization of petroleum derivatives attempted, it was not until 1927 that comprehensive, basic petroleum research was initiated through the combined efforts of the American Petroleum Institute and the National Bureau of Standards. According to a recent report by its director, Frederick D. Rossini, this program, continued on a long-range basis, has succeeded in isolating 72 paraffinic, cycloparaffinic and aromatic hydrocarbons to date in the gasoline and kerosene fractions of a typical petroleum sample. There appear to be no olefinic or acetylenic hydrocarbons in petroleum. This condition restricts the use of the uncracked material for chemical processing. However, several manufacturers of organic chemicals are equipped to do their own cracking of the paraffins and liquid petroleum fractions, and feasible processes for the manufacture of chemicals directly from petroleum paraffins have been developed and are being used.

* Reg. U. S. Pat. Off.

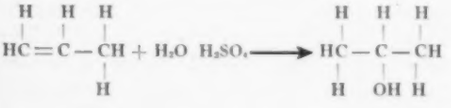
Growing demand for motor fuel during the early thirties forced a steady expansion of high-temperature cracking operations with which refineries supplemented their normal gasoline output by decomposing heavy oil fractions to lower-boiling products. Cracking, however, yielded not only gasoline but also substantial quantities of light gases which were used as fuel or burned at open flares. Due to their high olefinic content, these by-product gases constituted the major source of raw materials for the petroleum chemicals industry in general and for Shell Chemical in particular.

In the beginning the new industry attempted to use these waste gases directly as they were produced by the refineries. The great variety of components and impurities present in the cracked gases resulted in undesirable side reactions and low main yields plus the necessity of a laborious purification of the desired products.

In later years, however, the wide industrial acceptance of the new chemical derivatives and the technological advances of petroleum processing initiated a trend in refinery operations from few, broad distillation cuts used directly as finished products to more exacting fractionation. Today many narrow, "tailor-made" cuts are prepared and used as raw materials for special fuels and synthetic organic chemicals.

The manufacture of ammonia from natural gas has been discussed extensively in the trade literature, for ammonia was one of the first well-known chemicals associated with the petroleum industry. In Shell Chemical's plant at Shell Point the hydrogen required for ammonia synthesis is produced by the regenerative cracking of natural gas at high temperatures to carbon and hydrogen. The carbon is separated by washing and electric precipitation and constitutes an important by-product of this operation. The hydrogen is purified by washing, absorption and low-temperature fractionation and is then mixed with atmospheric nitrogen in the molecular proportions of ammonia. The actual synthesis, $3H_2 + N_2 = 3NH_3$, is accomplished under moderately high pressures, and the ammonia produced is liquefied or further processed to ammonium sulfate. The cracked gas feeds to Shell Chemical plants by the refineries are these distinct olefinic concentrates. These may be broadly classified as the ethane-ethylene, propane-propylene and butanes-butylenes fractions.

The reactivity of olefins and their ability, in the presence of sulfuric acid, to add water and form the corresponding alcohols are well known to the petroleum industry. Shell Chemical's first process for the utilization of cracked gases made use of this characteristic reaction. Known as hydration, it can be expressed as:



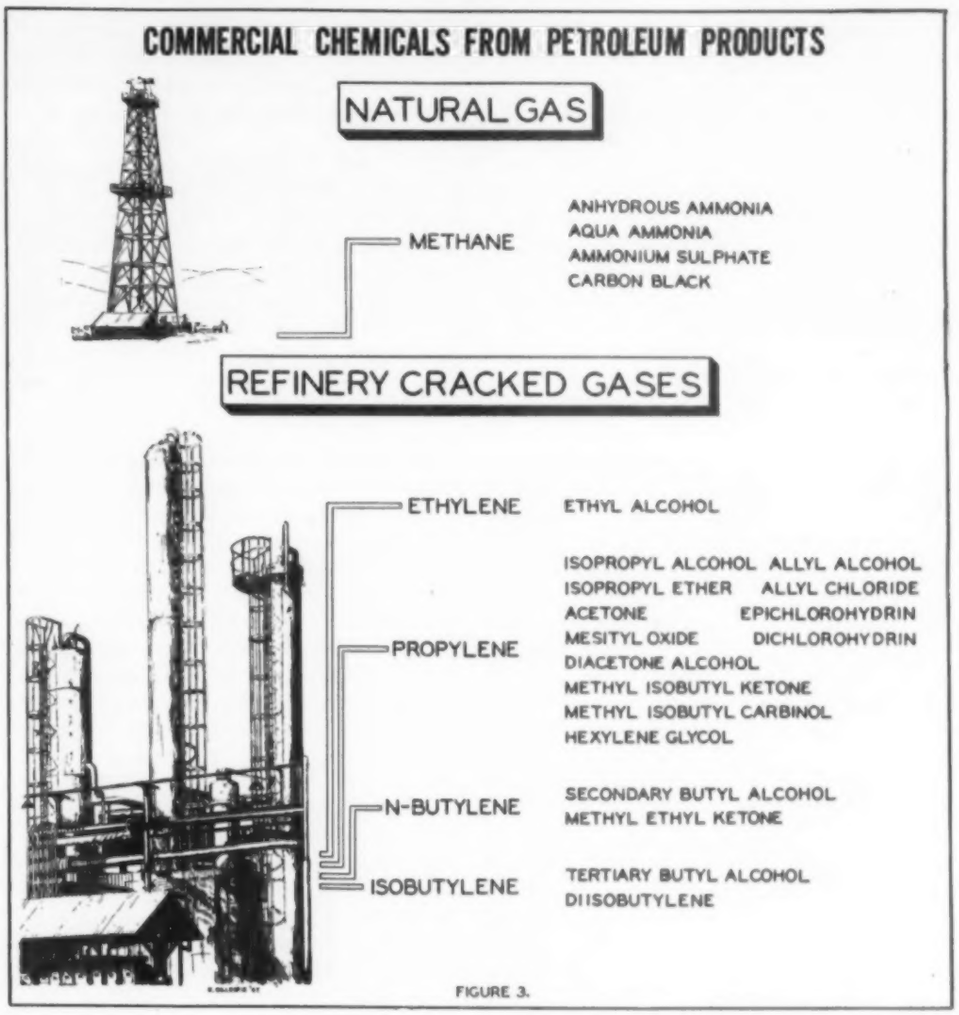
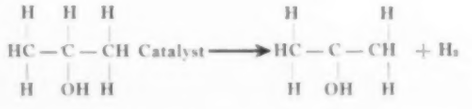


FIGURE 3.

for the manufacture of isopropyl alcohol from propylene. In practice this apparently simple synthesis requires careful control of operating conditions to suppress undesirable side reactions.

The next step toward product diversification was catalytic dehydrogenation, whereby two atoms of hol molecule to form a ketone:



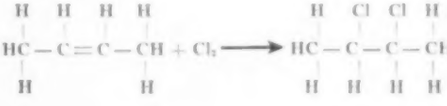
the reaction, in this case, converting isopropyl alcohol into acetone and hydrogen.

Further synthesis through more complex processes carried this method of utilizing cracked gases to the production of diacetone alcohol, mesityloxide, hexylene glycol and many other chemicals. This successful line of approach from petroleum to organic chemicals can be presented in simplified steps. These are:

(1) Preparation by distillation of fractions containing the desired olefins and corresponding paraffins, now usually done by the refinery.
(2) Absorption of the olefin in sulfuric acid of the proper concentration.
(3) Separation of the unreacted hydrocarbons, largely paraffins.
(4) Hydrolysis of the sulfuric acid and absorbed olefin to alcohol or, alternatively, to ether.
(5) Purification of the alcohol or ether.
(6) Catalytic dehydrogenation of the alcohol to ketones.
(7) Purification and further processing alcohols and ketones to more complex chemical products.

Shell Chemical's alternate approach to the use of cracked gases for chemical manufacture is chlorination, both additive and substitutive, developed commercially through Shell research.

The value of a chemical compound as a raw material or intermediate lies to a great extent in its reactivity. By virtue of their double bond, olefins as previously discussed are reactive hydrocarbons. Additive chlorination depends on the ability of chlorine to saturate this double bond and form chlorinated hydrocarbons:

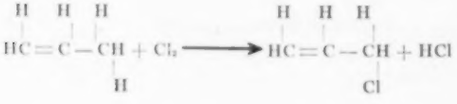


This reaction, through which dichlorobutane is obtained, was of interest to Shell Chemical since 1935 as a new approach to organic synthesis and through its importance as a first step in the manufacture of butadiene, which, at the time, the Germans were using as the major component of Buna synthetic rubbers.

Along this latter line of thought an efficient method was developed for the dehydrochlorination, or removal of hydrogen chloride, necessary in the production of butadiene. Based on this process the first commercial plant for the manufacture of butadiene from petroleum was built by Shell Chemical.

While additive chlorination introduces chlorine into the hydrocarbon molecule, it does so by utilizing the reactivity of the olefin's double bond, making it, therefore, no longer available in the finished product. The desirability of this reactivity has already been pointed out. A major contribution to scientific knowledge was the development of a process which introduces chlorine into the molecule without destroying the double bond. This process, first announced by Shell in 1938, is known as substitutive chlorination.

It was developed for the reaction of chlorine and propylene:



Allyl Chloride, the chlorine-substituted propylene resulting from the above reaction, became through its unusual reactivity the basis of a new line of chemicals, from allyl alcohol to glycerin, known in general as allyl derivatives.

The reactions and methods of approach described apply in general to all the low-boiling olefins encountered in petroleum operations. Figure 3 shows some of the derivatives of the individual olefinic starting materials.

Equipment has been installed for the pyrolysis of paraffins in Shell Chemical plants. This cracking operation will increase the available supply of olefins for chemical manufacture. The feed to this unit will be a mixture of paraffins, and cracking conditions may be controlled to yield varying proportions of olefins to meet specific requirements.

Shell Chemical's products have followed a logical line of development prompted by industrial demand, availability of raw materials and technical advances in the fields of organic synthesis. Based on their principal applications, Shell Chemical's products may be broadly classified into three groups: chemical intermediates, organic solvents and agricultural products. Following is a list of Shell Chemical products arranged to conform to this classification:

Chemical Intermediates: Acrolein, allyl alcohol, allyl chloride, cyclohexane, diisobutylene, epichlorohydrin, glycerol dichlorohydrin, methallyl alcohol, methallyl chloride, methylpentadiene.

Organic Solvents: Acetone, diacetone alcohol, dimethylsulfolane, ethyl, alcohol, hexylene glycol, isopropyl alcohol, isopropyl ether, mesityl oxide, methyl ethyl ketone, methyl isobutyl carbinol, methyl isobutyl ketone, secondary butyl alcohol, tertiary butyl alcohol, 1, 2, 3, trichloropropane.

Agricultural Products: Anhydrous ammonia, aqua ammonia, ammonium sulfate, D-D soil fumigant.

These products are marketed today either commercially or in trial-lot quantities for evaluation by the chemical industry. It would be impossible within the scope of this article to cover the multitude of applications of products in the first two categories. In general it may be said that Shell Chemical intermediates find use in the production of plastics and textiles; in the manufacture of pharmaceuticals, anesthetics and resins; in the synthesis of food flavorings, detergents and fumigants; and in numerous other fields for which they are qualified by their reactivity.

Outstanding intermediates are the allyl derivatives. Allyl alcohol, allyl chloride and epichlorohydrin are all active, versatile chemicals due to the presence of more than one reactive group within the molecule. They enter into the manufacture of plastic materials, surface-active agents, humectants, anesthetics and as a basis for the synthesis of various resins.

Organic solvents have been manufactured by Shell Chemical since the first plant for olefin gas utilization was built at Martinez, California. These chemicals find their main applications in the protective coating and synthetic fiber industries. In this group are chemicals of extensive use and established reputation in industry such as acetone, methyl ethyl ketone and isopropyl alcohol.

Less known products in this group are such useful chemicals as hexylene glycol, a high-boiling solvent, coupling agent and humectant, and dimethylsulfolane, now in the trial-lot stage, a highly selective solvent valuable in liquid-liquid and liquid-vapor extraction.

The effect that the chemical synthesis of these products from petroleum has had in industry can be generalized from a few concrete examples. Prior to 1933, isopropyl alcohol sold at prices in excess of $1.00 per gallon, reaching $2.00 at times of peak demand. After its production from petroleum was established, the market price dropped to 35 cents per gallon and since then has experienced only minor fluctuations from this figure. This reduced price made it competitive with grain alcohol. The stabilizing effect of this competition benefited consumer industries and, in wartime, made possible the diversion of more grain alcohol to essential purposes such as the manufacture of synthetic rubber and explosives.

The price history of acetone provides an interesting example of the dampening effect of steady synthetic production on fluctuating prices of chemicals. From a high point of 45 cents per pound during World War I the price curve undergoes uncontrolled variations until the early thirties when synthetic production lowers and steadies the market price at 10 to 11 cents per pound. After Shell Chemical's plants reached full production, the price dropped to a further low of five to seven cents.

Production of synthetic ammonia in the United States for the year 1939 amounted according to the Bureau of Census to 621 million pounds. At that time Shell Chemical was the only manufacturer using natural gas as raw material. The most recent figures, taken from Facts For Industry, show the influence of government-sponsored plants, setting the synthetic ammonia production for 1946 at 1,451 million pounds, now approximately 50 percent being derived from natural gas.

Carbon black, principal by-product of ammonia manufacture, finds its main application in steel manufacture as a metallurgical fuel and carbonizing agent.

Of particular interest in the list of Shell Chemical agricultural products is a relatively new chemical, the soil-fumigant marketed under the registered name of D-D. The effectiveness of D-D against soil-borne pests, particularly destructive root parasites such as the "root-knot" nematode, created an unprecedented demand for the material which has resulted in an upward revision of its originally scheduled production.

To provide a proving ground for Shell's agricultural products, a new agricultural laboratory and experimental farm was placed in operation at Modesto, California, during the second half of 1946. The project carries the products through the laboratory, greenhouse and farm stages of development. Several of the oil companies engaged in chemical manufacture have similar projects designed to contribute to the progress of agriculture in general and aid in determining the advisability of full-scale production of new chemicals. The Shell laboratory was located at Modesto because of the versatility of climate in this section of the country and its relative proximity to the majority of Shell manufacturing plants.

In close parallel to the manufacturing operations, the marketing activities of the chemical industry have become increasingly complex. In recent years this has resulted in a trend from agressive high-pressure selling methods to the scientific development and marketing of chemicals. The main factors in this change in marketing practice have been the high degree of specialization of the

Part of Shell's agricultural ammonia and ammonium sulfate plant at Pittsburg, Calif., the first in this country to manufacture ammonia from natural gas.

Compressors in the Pittsburg ammonia plant.

products and the technical alertness of consumers. The revised conception of industrial selling has logically led to the inclusion within the boundaries of marketing of several functions previously non-existent or performed independently by other departments in the organization. In furtherance of sales activities, Shell Chemical relies on three main lines of marketing effort: sales development, products application and economic research. Broadly, they perform the following functions:

(1) Development of market for new products or "experimental marketing." This work is essential to an industry which depends for economic survival on the successful marketing of by-products as well as main products.

(2) Development of new uses for established products. This function insures continued demand for the products by widening their market.

(3) Coordination of laboratory activities with prospective customers' interests, and assistance in guiding company research.

(4) Help in the selection of potential products for commercial development. The extent of the possibilities for chemicals manufactured from petroleum far exceeds the 200 or thereabouts now being commercially or semi-commercially produced by the industry. The decision to manufacture a product, based on economic feasibility, market potentialities and other factors becomes an important one.

(5) Accumulation of extensive technical information concerning the products and their present and potential applications in industry.

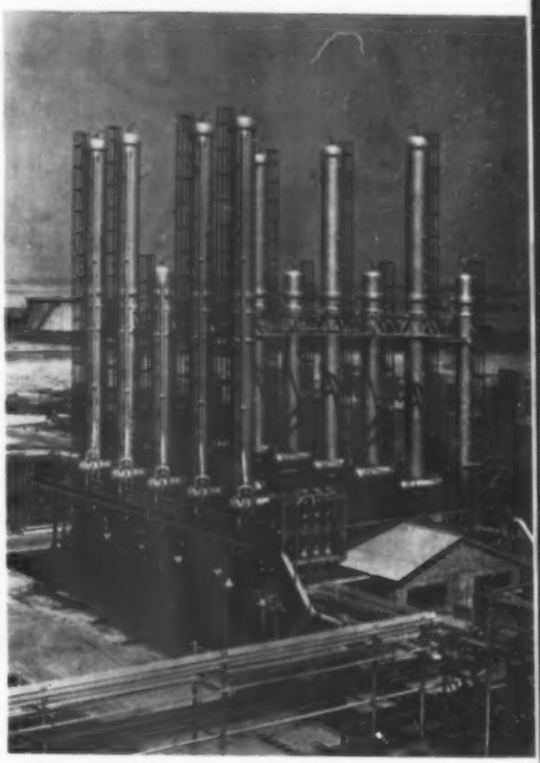
(6) Technical service or the investigation and solution of customers' problems. This expert assistance has come to be regarded as an integral part of the sales process.

(7) The long-range economic point of view developed through study of probable future price and volume conditions not only of the company's products but of those of competitors as well.

For nation-wide distribution of its products, Shell Chemical maintains division offices in San Francisco and New York and district offices in the principal chemical-consuming centers in the country. An export department handles foreign sales activities, operating through the world-wide marketing and distribution facilities of the Shell organization.

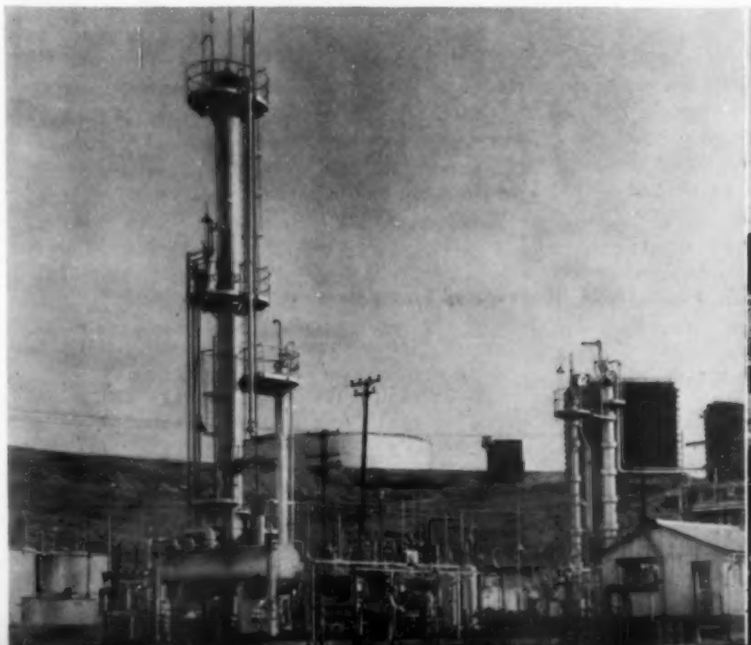
The synthetic organic chemicals industry cannot, in an analysis of its future possibilities, be considered separately from the petroleum industry as a whole. It must be looked upon, rather, as logical development of the latter. In this sense it is interesting to note that while the petroleum chemicals industry has been in a position to draw heavily upon petroleum processing techniques

(Continued on page 73)

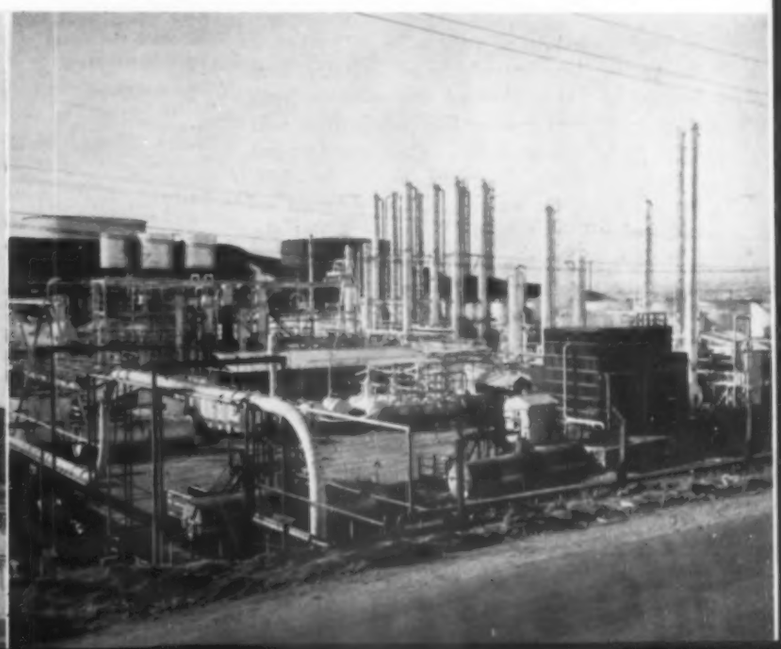


Frantionating columns at Shell's chemical plant at Dominguez, Calif.

Market development plant for the production of semi-commercial quantities of new petroleum-derived chemicals.



General view of Shell organic chemical manufacturing plant at Martinez, Calif.



OIL'S PART IN ARGENTINA'S FIVE YEAR PLAN

By Ing. Bernardo Rikles

DEVELOPMENT of oil production and expansion of transportation and processing facilities are part of the program of industrial improvement contemplated by President Peron's five-year plan. This plan originated with the Post War Economic Council when General Peron, then vice president in the revolutionary government, was at the head of that body. It, therefore, enlists the keen interest and energetic support of the President.

So far as it relates to oil, the plan does not lay down any new policy or indicate any likelihood of departure from the line that has been followed heretofore. It is in reality a blue-print for enlarging the scope of operations of Yacimientos Petroleos Fiscales, government-owned oil company. Anything that the private companies may decide to undertake in the way of plant construction or improvements will be in addition to the changes scheduled for YPF or will depend upon agreements which they may make with the government.

In broad outline the proposal for oil is to bring about an increase of 8,284,000 barrels per year in the production of crude oil and of 8,240,000 barrels in refining capacity. Along with this will go a corresponding enlargement of transportation and marketing facilities to take care of the larger output. The estimated investment required is roundly $155,000,000 U. S. currency. The five-year plan is already in action, and it is reported that the government has extended to YPF a preliminary credit of $7,500,000 for the purchase of material and equipment for the oil industry. Such purchases are made through the IAPI, the Argentine Institute for the Development of Exchange.

Tentative schedules of work to be undertaken in the various branches of the oil industry have been set up. It is, of course, impossible to determine in advance exactly how much effort will have to be expended to produce the required results in certain directions, as in the drilling of wells, for example. The program established will be followed, however, during the first years of the plan with such minor changes as circumstances may dictate later.

Exploration activities prescribed by the plan call for the survey of 600,000 square kilometers — 148,300,000 acres. This represents roughly 40 percent of the area of the country that remains unexplored or that has been abandoned previously as not offering sufficiently encouraging indications of being petroliferous. In making these surveys, the most modern geophysical methods will be employed including the use of the air-borne magnetometer. Equipment is already being purchased in the States, through the Argentine Government Oil Fields with offices at 80 Broad St., N. Y. To carry on the survey work, YPF will enlarge its present geological staff of 60 to 88 and will increase the number of native field crews from 14 to 30 by the beginning of 1949. Of the total area to be surveyed, 20 percent or roundly 30,000,000 acres will be subjected to intensive study for wildcat drilling, while the remainder will be covered by ordinary geophysical methods. Drilling of 314 wells is contemplated, of which 128 will be sunk to determine structure and 186 will be wildcats. These tests are expected to yield more comprehensive information than has been previously available as to geological formations existing in different parts of the country.

Crude oil production by YPF is stated as amounting to 16,780,000 barrels in 1946. According to the plan this is to be raised to 22,500,000 barrels by 1951, an increase of 60 percent. To bring this about, it is proposed to restore to activity 1,000 wells abandoned because of lack of equipment during the period 1943-46 and to drill 1,500 new wells. This will necessitate extensive additions to drilling equipment. Instead of the 40 crews engaged in drilling in 1946, the number is to be increased to 103 by 1951.

Throughput capacity of the company's refineries which is now rated at 14,200,000 barrels yearly is to be extended by 47 percent to 25,020,000 barrels. The greater part of this addition to capacity will be provided by a new refinery capable of processing 22,000 barrels daily which will be erected near Buenos Aires. YPF recently invited bids in New York, London and Buenos Aires for the construction of this plant. It will include a catalytic cracking installation, together with alkylation, isomerization and ethyl blending units for the production of 100-octane aviation fuel. Viscosity breakers and an asphalt extraction plant also will form part of the completed refinery which will produce, in addition to aviation gasoline, motor fuel of 77 octane, kerosene, tractor oil, diesel oil, fuel oil of low viscosity and asphalt.

This refinery is to be in operation by mid-year 1948. In 1949-50 the present lubricating plants of the La Plata refinery are to be modernized. Solvent deasphalting, treating and dewaxing plants will be erected. The present clay contact plant has been enlarged and modernized by YPF's technical staff. Research is underway for the production of additives, and it has been an-

TABLE I

Crude Production Under Five-Year Plan

	Crude Oil Thous. Bbls.	Total Wells Drilled	Total Wells Producing
1947	14.2	4.345	1.752
1948	16.3	4.548	2.574
1949	18.6	4.854	2.815
1950	20.2	5.248	3.084
1951	22.5	5.691	3.388

TABLE II

Refinery Throughput Under Five-Year Plan
(In Thousands of Barrels)

Products	1947	1948	1949	1950	1951
Local Crude Oil	14,800	16,900	19,200	20,800	23,000
Imported Crude Oil	1,970	428	1,730	132	1,900
Total Crude Run	16,780	17,328	20,930	20,932	24,900
Aviation Gasoline	126	131	364	364	364
Motor Gasoline	4,150	4,600	7,500	7,300	10,000
Kerosene	1,110	975	1,515	1,340	1,711
Tractor Oil	502	550	370	425	360
Gas Oil	430	230	525	288	510
Diesel Oil	794	724	851	724	1,040
Fuel Oil	8,260	8,670	6,050	6,580	7,200
Lubricants	219	219	219	219	219
Asphalt	348	380	820	820	820
Coke (Tons)	—	42	616	616	616

TABLE III Proposed Expenditures

Allocation	In Millions of Dollars (Dollars = 4 Pesos) 1947	1948	1949	1950	1951	Total
Equipment for Producing Refining, Transport & Marketing	26.0	15.9	14.5	13.3	11.9	81.6
Special Projects of Industrial Character	22.2	11.2	14.8	12.5	5.0	65.7
Exploration work	1.2	1.5	1.8	1.8	1.1	7.4
Total Expenditure	49.4	28.6	31.1	27.6	18.0	154.7

nounced as a part of the five-year plan that a new brand of lubricants for motor cars, "Supermovil," with additives to enhance some of its qualities will be placed on the market.

To take care of future increase in crude production and demand, a new 19,000-barrel refinery is to be built by 1950 and to go into operation during 1951.

The refining program, as shown in Table II, contemplates the importation of crude oil from Colombia, Venezuela, Ecuador and Peru. The government already has in effect an agreement with Bolivia for the import of crude from one of its fields into Argentina.

neers to Europe and the United States to survey the possibilities of purchasing others.

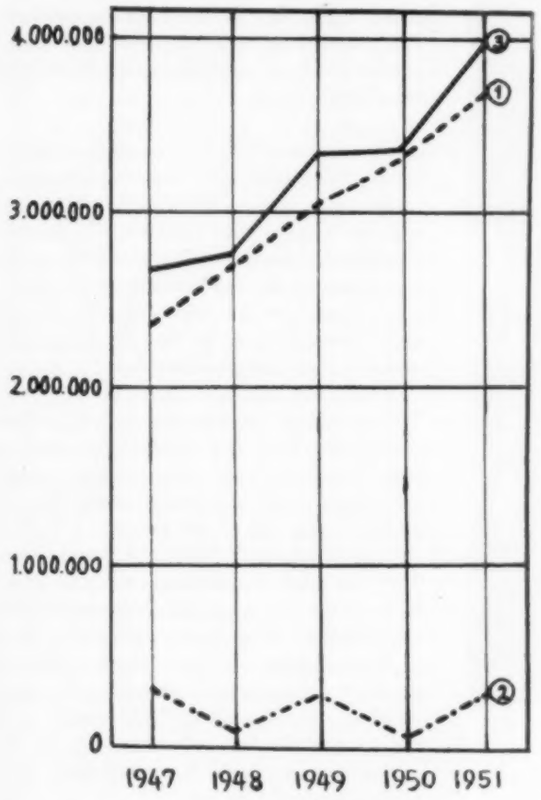
Storage, filling, handling and distributing facilities, including filling stations, will be increased in accordance with the expanded production. Special attention is to be given to the distribution of aviation gasoline and lubricants.

Many of the motor trucks used at present by YPF will have to be replaced. They were put to hard usage during the war period and need to be replaced by more modern units with larger capacity and more speed in deliveries.

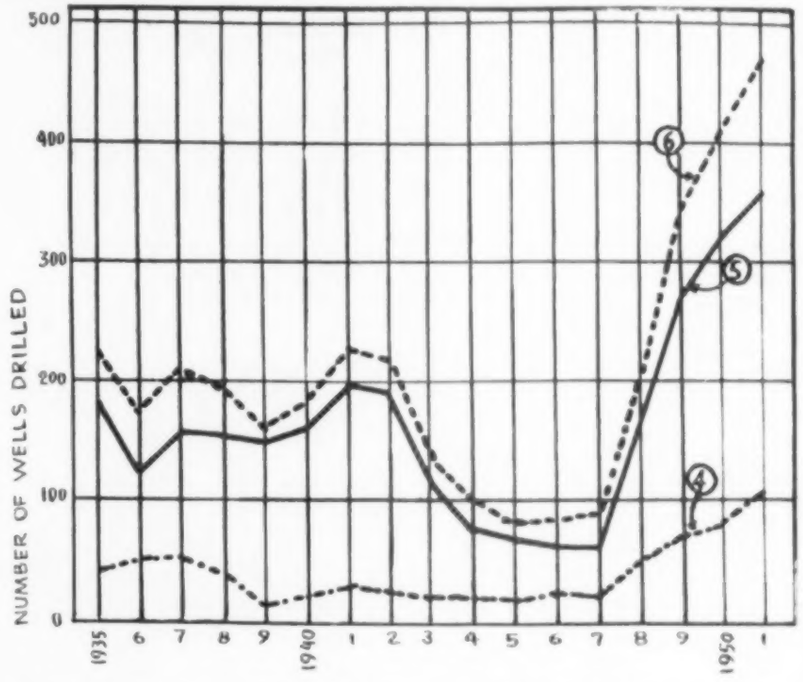
Financial requirements of the plan are to be met

Gas Company). A most difficult problem in the construction of this line was that of obtaining the necessary line pipe in view of the worldwide shortage in this product. A quantity of pipe was obtained in Italy. The remainder is to be fabricated in Argentina from imported steel plate. It has been learned that manufacture of the pipe in this country will be undertaken by Armco and Fabricaciones Militares (Argentine Government Military Factories).

The Comodoro Rivadavia gas pipe line is to be in operation by 1949. Other minor gas pipe lines are La-Plata-Buenos Aires and Tupungato-Mendoza, some 30 miles each, already in operation. New pipe lines are contemplated for San



Five year Refining Plant. 1. Native crude oil. 2. Imported crude oil. 3. Total run to stills.



Five year Drilling Plan. 4. Structural and Wildcat wells. 5. Production and wildcats in proven areas wells. 6. Total wells drilled.

Tanker transportation facilities will be increased from 12,300,000 barrels per year to 23,400,000 barrels. YPF is to purchase four new 16,500 ton tankers, revamp three existing tankers and purchase a new vessel especially fitted for light oil (gasoline and kerosene). When this part of the plan is completed, YPF will have six ocean-going tankers with a capacity of 99,000 tons, seven ships with a capacity of 84,000 tons for offshore transport from Comodoro Rivadavia and Bahia Blanca to Buenos Aires, five steamers for equipment and products in drums and cans with a capacity of 17,500 tons, and two ships for river transport with a capacity of 7,000 tons. YPF has bought some ships and has sent marine engi-

by allocations for successive years shown in Table III.

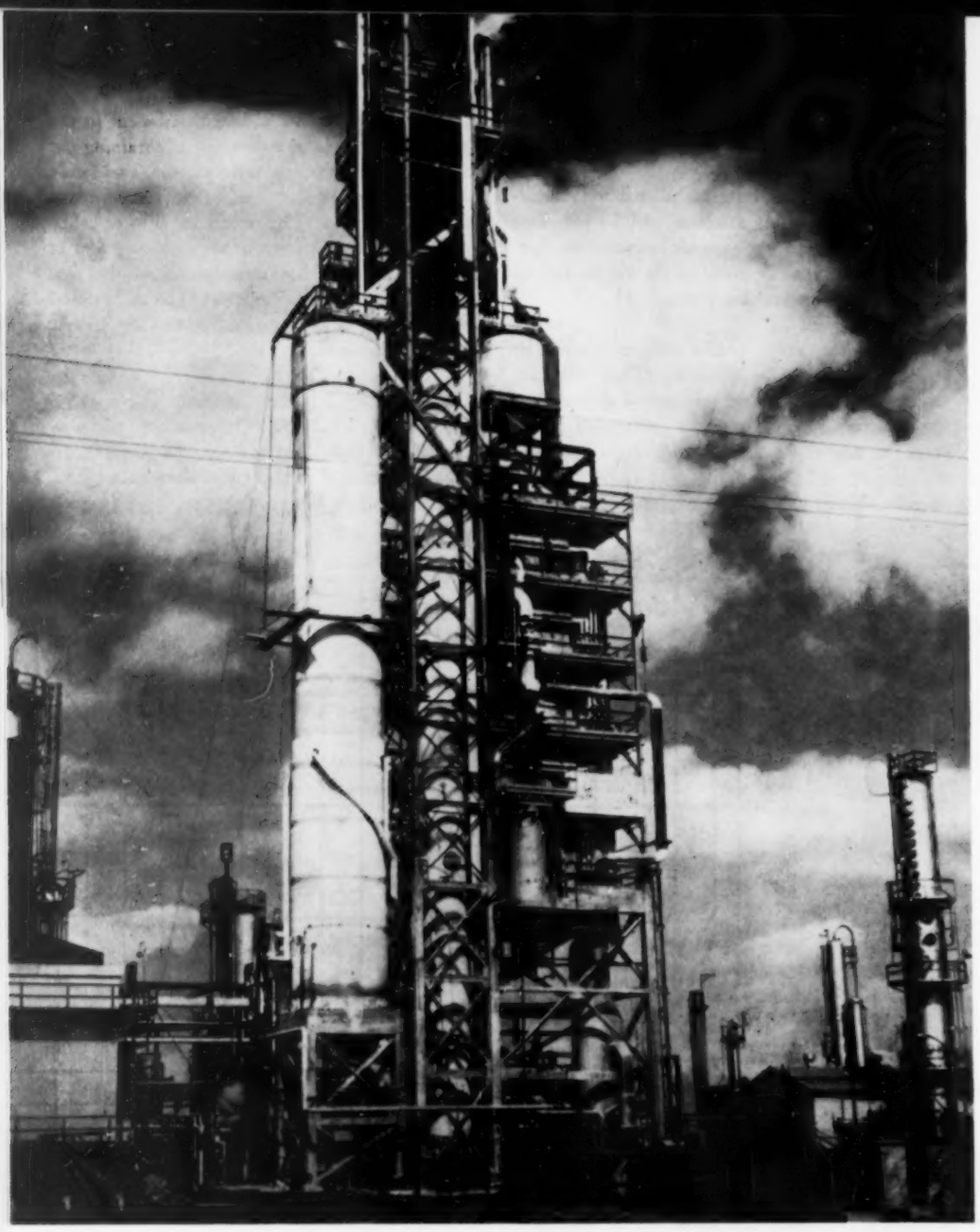
Utilization of natural gas resources plays an important part in the five-year plan which proposes to serve the country as fully as feasible with natural gas, LPG and refinery gas for domestic and industrial uses.

It is planned to have working by 1951 five gas pipe lines with a total length of 1941 KM (1213 miles). Of these, the main line is the Comodoro Rivadavia-Buenos Aires gas pipe line, construction of which started in February last. The first section of 30 miles was finished on June 4. The total length of line is to be 1120 miles. Part of the pipe line is to be built under contract, but most of it will be under the Direction General del Gas del Estado (Argentine Government

Lorenzo-Rosario, Sampana-Buenos Aires and Chachapoyas-Salta to supply along with refinery gas the cities of Rosario, Buenos Aires and Salta from the neighboring refineries.

Natural gas consumption now amounts to 6.1 percent of the total consumption but is to reach 82.1 percent by 1951; LPG and refinery gas at present representing 32.7 percent of total consumption will be reduced to 10 percent, although its volume will be increased largely; artificial gas will be reduced from 54.2 percent to 7.2 percent. The number of consumers is to be increased from 330,000 to 700,000.

Money to be invested for carrying out this portion of the plan is figured as $65,000,000 U. S., of which nearly 50 percent is for the Comodoro Rivadavia-Buenos Aires gas pipe line.



First Postwar small-scale TCC-Houdry catalytic cracker at Leonard Refineries, Inc., Alma, Mich.

THE Leonard TCC unit, the first small-scale catalytic cracking unit to be installed since the war, was put on stream March 18, 1947. The plant was designed to process 4500 barrels per day of reduced Michigan crude from which a reactor charge of 3000 barrels per day would be derived. These rates were fixed by the capacity of existing auxiliary equipment, the use of which was paramount in all design considerations. However, the catalytic equipment was purposely oversized to permit a future reactor charge of approximately 6,500 barrels per day when the crude throughput of the refinery is increased.

For all practical purposes it may be considered that the catalytic reactor and regeneration kiln merely supplanted the reaction chamber of an existing thermal cracking unit. Through careful planning, the existing thermal cracking raw charge pump, heat exchangers, light and heavy oil cracking furnaces, flash chamber, fractionating tower absorption column and stabilizing column were all utilized in preparing the unit to function as a catalytic cracking plant.

The process flow for the catalytic section of the plant is shown schematically in Figure No. 1. From the heaters the partially vaporized reduced crude enters the former thermal cracker flash chamber which is now employed as a tar separator. From this vessel, which operates at a temperature of 825°F and a pressure of 7 psig, 70 percent to 80 percent of the reduced crude is flashed overhead as reactor charge. The bottoms from the tar separator are used in heavy fuel oil blends or charged to a vacuum tower for the production of asphalt. Steam, employed in the tar separator to assist in the vaporization of the reduced crude, is superheated to approximately 900°F and the quantity amounts to about 3,100 pounds per hour or eight percent by weight of the reactor charge.

The oil vapors from the tar separator enter the top of the cracking reactor where they come in contact with regenerated catalyst. The catalyst and oil vapors flow concurrently downward through the reactor and are withdrawn from the bottom of the vessel as separate streams; the catalyst passes to the elevator for return to the regenerating kiln, while the oil vapors are directed to the fractionation system.

The continuous circulation of catalyst in the system is maintained by a single, 153-foot-tall, endless chain, bucket-type elevator which transports both spent and regenerated catalyst from the bottom to the top of the structure. Each elevator bucket is divided into three compartments. The two outer compartments carry spent catalyst, and the center compartment carries regenerated catalyst. The elevator circulates 75 tons per hour of spent catalyst to the kiln and 75 tons per hour of regenerated catalyst to the reactor. At reactor charge rates of 3,000 barrels per day, the 75 tons per hour of catalyst circulation is equivalent to a volumetric catalyst to oil ratio of approximately 4.5 to one.

Spent catalyst flowing from the bottom of the reactor is carried to the top of the structure where it is discharged into chutes leading into a hopper above the regenerating kiln. From the kiln hopper the catalyst flows downward into the kiln where the coke is removed by controlled combustion with air. The excess heat of combustion is removed by the generation of 290-pound steam. Regenerated catalyst flows from the bottom of the kiln to the elevator buckets to repeat the cycle of flow through the system.

Several innovations have been made in the design of the Leonard TCC plant to reduce investment costs and to improve performance. The overall height of the catalytic section has been reduced about 50 feet below that of older TCC installations. Also the catalytic section occupies

This article is a condensation of a paper presented before a regional meeting of the Western Petroleum Refiners Association at Alma, Mich., July 16, 1947. At that time members of the association visited Leonard Refining Company's new Houdry TCC unit recently built by Catalytic Construction Co., subsidiary of Houdry Process Corp.

AND OPERATION OF LEONARD TCC UNIT

By George Kelso, C. C. Peavy, G. D. Myers and A. W. Hoge*

only about 1,250 square feet of ground area and, therefore, was conveniently erected at the site of the former thermal cracker without changing the location of any existing equipment.

The reactor catalyst hopper, the hot catalyst storage bin and the reactor are parts of a single self-supporting cylindrical vessel. The hopper, occupying the top portion of the vessel, is connected to the reactor proper, which occupies the lower portion of the vessel, with a 45-foot long catalyst seal leg, and the intermediate space surrounding the seal leg is utilized as the hot catalyst storage bin.

The 12-foot diameter reactor is designed especially for concurrent flow of oil and catalyst, a development proved in several operating units. With this type of flow, both the catalyst and oil vapors are introduced at the top of the reactor and pass downward through the reactor. The vapors are disengaged from the catalyst at the bottom of the reactor catalyst bed in a device designed to prevent the entrainment of particles of catalyst in the effluent vapor stream. The reactor is designed for a maximum catalyst bed depth of 15 feet and is arranged so that with only minor changes it may be adapated to mixed-phase operations wherein a portion of the reactor charge is injected as a liquid. Actually a liquid injection nozzle is being designed and the charging of non-vaporizable material will be started very shortly. The liquid charge will be cut from a vacuum tower fractionation of the tar separator bottoms.

The kiln is of the solid-bed type and is similar in basic design to that of larger TCC units but is reduced in height to conform to a lower carbon burning load. It consists of seven alternate burning and cooling zones in which the amount of air for combustion, as well as the number of cooling coils in use for removal of heat, may be varied in order to carry out the regeneration of the spent catalyst under the most favorable conditions. Further simplification in kiln design has been made in that the fresh air for combustion and the outgoing flue gases enter and leave each zone on the same side of the kiln so that only one air inlet manifold and one flue gas outlet manifold are required.

A newly designed catalyst distributing device is installed between the catalyst hopper and the kiln proper. Spent catalyst, introduced centrally into the distributor, flows into the first zone of the kiln through 16 catalyst feed pipes. The feed pipes are so designed that the upper ends, which are connected to the bottom head of the distributor, are arranged in a circular pattern while the lower ends, which extend into the kiln, are arranged in a square-pitch pattern covering the entire cross-sectional area of the kiln. Such a device has been proved to contribute to uniformity in kiln operation by its control of particle size distribution in solid beds of catalyst.

On the Leonard TCC kiln the exhausting of the flue gases directly to the atmosphere from the main flue gas manifold had resulted in appreciable savings in equipment. In the TCC units erected during the war, cyclone separators were installed in the flue gas stack above the regenerating kiln as a precautionary measure in order to collect particles of catalyst that may have been carried out of the kiln by the outgoing flue gases. Experience has proved, however, that an insignificant amount of catalyst is lost in this manner, and thus the need for cyclone separators in the outlet stock is obviated.

On the former units the elutriator, which is the device used to maintain a satisfactory average catalyst particle size in the system by means of air classification, was also located in the flue gas stack above the kiln in order to utilize the flue gas cyclones to collect the elutriated "fines." A small portion of the regenerated catalyst stream was continuously fed into the top of the elutriator and contacted in a countercurrent manner with a portion of the outgoing flue gases; the small catalyst particles were carried out of the elutriator into the cyclones by the flue gas stream, while the large catalyst particles flowed by gravity into the center of the kiln hopper immediately below. Since, however, the cyclones have been proved unnecessary in the main flue gas outlet stream, the elutriator on the Leonard unit has been installed at a much lower elevation and made completely independent of the kiln system. A small stream of fresh air from the blower is the source of classification air and a single small cyclone separator mounted atop the elutriator is sufficient to collect all of the "fines" produced. Also, the large particles of catalyst from the bottom of the elutriator flow into the kiln main outlet catalyst line. This modification has served to increase the kiln coke-burning capacity by eliminating the return of several tons per hour of regenerated catalyst to the kiln.

Circulation of catalyst is accomplished with a single, split-bucket type elevator in contrast to the older TCC units which were equipped with separate elevators for the spent and regenerated catalyst streams. Several other improvements in elevator design have also been incorporated. For example, the entire elevator mechanism, including the cylindrical housing, is suspended from the top of the structure of the TCC unit proper. Insulation of the housing has been simplified.

Another novel arrangement in the processing plan of the Leonard catalytic plant is the utilization of a barometric-type, direct-contact condenser in the synthetic crude tower overhead stream. The advantages of decreased pressure drop and low maintenance cost afforded by the barometric-type of condenser are noteworthy. For example, with a shell and tube condenser at Leonard, the tar separator would have operated at approximately 10 psig in contrast to the six to seven psig pressure resulting from the use of the barometric condenser. The lower tar separator pressure permits the production of more tar separator overhead or reactor charge at the same transfer line temperature. The synthetic crude tower overhead vapors enter the base of the barometric condenser wherein the heavier hydrocarbon components are condensed by a down-flowing stream of cooling water and pass into the gas and water separator tank on which the barometric is mounted. The non-condensable portion of the synthetic crude tower overhead stream passes up through the barometric and enters the top of the gas and water separator from which the gas compressors take suction. At the designed reactor charge rate and with a 75°F inlet water temperature, a cooling water supply of approximately 1,250 gallons per minute is required to condense and cool the synthetic crude tower overhead stream to 100°F. The rate of flow of

Table No. 1

Summary of TCC Unit Time Efficiency
9:30 PM, March 18, 1947 to 9:30 PM, June 18, 1947

Off Stream Time		
Hours	% of Total	Reason
2.3	2.5	Catalyst Circulation Interrupted
16.7	18.1	Circulating Water Pump Bearings Replaced
25.3	27.4	Refinery Power Failures
48.0	52.0	Stabilizer Cleaned
92.3	100.0	

Hours on Stream 2115.7
On Stream Efficiency 95.8%

* Catalytic Construction Corp., Philadelphia.

Table No. 2

May 17, 18, 19 & 20, 1947

Recycling Heavy Catalytic Gas Oil Product Yields and Inspections

	BPSD	Vol. %	°API	ASTM Distillation —°F. IBP	10%	50%	90%	EP	RVP	CFR-M Octanes Clear	+3cc
Adams Reduced Crude	3859		20.4	267	(5.3% @ 450°F.)						
Heavy Catalytic Recycle	773		22.8	478	574	618	702	714			
Total Heater Charge	4632										
Tar Separator Bottoms	1843		11.0								
Total Reactor Charge	2789		30.0	(6.0% @ 450°F.)							
Virgin Reactor Charge	2016	100.0									
Stabilized 400° EP Gaso.*	1030	51.1	63.7	84	108	206	372	402	8.7	78	85
Light Catalytic Gas Oil	494	24.5	31.6	358	460	480	524	560			
Heavy Catalytic Gas Oil	204	10.1	22.8	478	574	618	702	714			
Excess C_4 Fraction	167	8.3									
C_3 and Lighter	6.2 Wt. %										

* CFR—M Octane Clear—78—with 3cc TEL 85

Table No. 3

Principal Operating Conditions

Reactor		Kiln	
Tar Separator Oh'd. Temp.	— 800°F.	290# Steam Production—Over	20,000 #/Hr.
Reactor Catalyst Inlet Temp.	—1020°F.	Regeneration Air Rate—11,500 CFM	
Recycle Ratio, V/V	— 0.38		
Catalyst/Oil Ratio, V/V	— 3.6		
Space Velocity, V/Hr/V	— 0.7		
Reactor Inlet Pressure	— 4.4 PSIG		

Table No. 4

June 2 & 3, 1947

Once Through Operation Product Yields and Inspections

	BPSD	Vol. %	°API	ASTM Distillation —F° IBP	10%	50%	90%	EP	RVP
Reed City Reduced Crude	2961		27.6	270	(3.7% @ 450°F.)				
Recycle	1020		32.8	442	472	494	540	584	
Total Heater Charge	3981								
Tar Separator Bottoms	533		15.2						
Total Reactor Charge	3448		31.6						
Virgin Reactor Charge	2928	100.0		(5.0% @ 450°F.)					
Stabilized 400° EP Gaso.*	1325	54.5	61.8	88	112	224	390	408	9.3
Light Catalytic Gas Oil	514	21.2	32.8	442	472	494	540	584	
Heavy Catalytic Gas Oil	257	10.6	19.0						
Excess C_4 Fraction	219	9.0							
C_3 and Lighter	6.8 Wt. %								

* Octane Test Clear—78 CFR—M—89 CFR—R

Table 5

Principal Operating Conditions

Reactor		Kiln	
Tar Separator Oh'd. Temp.	— 820°F.	290# Steam Production—18,000	#/Hr.
Reactor Catalyst Inlet Temp.	—1010°F.	Regeneration Air Rate—11,000	CFM
Recycle Ratio, V/V	— 0.42		
Catalyst/Oil Ratio, V/V	— 2.8		
Space Velocity, V/Hr/V	— 0.9		
Reactor Inlet Pressure	— 5 PSIG		

Table 6

June 2 & 3, 1947

Once Through Operation Product Yields and Inspections

	BPSD	Vol. %	°API	ASTM Distillation —°F. IBP	10%	50%	90%	EP	RVP	Wt. % S.
Reed City Reduced Crude	3980		27.2	430	584	(32% @ 670°F.)				
Tar Separator Bottoms	895		19.4							
Reactor Charge	3085	100.0	31.1	284	555	690	(72% @ 711°F.)			0.64
Stabilized 400° EP Gaso.*	1450	47.1	62.5	90	110	202	374	400	9.3	0.046
Light Catalytic Gas Oil	750	24.4	31.4	410	480	522	586	636		0.28
Heavy Catalytic Gas Oil	432	14.1	22.2	516	636	684	752	760+		0.93
Excess C_4 Fraction	328	10.6								
C_3 & Lighter	9.9 Wt. %									
Carbon	5.0 Wt. %									

Table 7

Principal Operating Conditions

* Octane Test Clear—77 CFR—M—with 3cc TEL 85

Reactor		Kiln	
Tar Separator Oh'd. Temp.	— 818°F.	290# Steam Production—16,500	#/Hr.
Reactor Catalyst Inlet Temp.	—1050°F.	Regeneration Air Rate—9,500	CFM
Catalyst/Oil Ratio, V/V	— 3.9		
Space Velocity, V/Hr/V	— 0.8		
Reactor Inlet Pressure	— 5 PSIG.		

effluent water from the separator tank is automatically regulated by a liquid level controller which is sensitive to the location of the gasoline and water interface in the quiescent section of the separator.

During the first three months of operation of the unit, from March 18 to June 18, 1947, the plant had an on-stream efficiency of 95.8 percent. Of the total down-time of 92.3 hours only 19 hours were attributable to the catalytic section. Moreover, of the 19 hours only 2.3 were due to interruptions in catalyst flow, the remaining 16.7 hours having been consumed in replacing bearings in the kiln circulating water pump. On three occasions failure of the supply of electrical power to the refinery caused temporary off-stream periods amounting to a total of 25.3 hours. In all such instances, however, the unit was promptly put back into operation as soon as stable power supply was restored. Also, 48 hours of down-time occurred between May 28 and 30, 1947, when the unit was purposely taken off stream to clean the stabilizer column in the gas plant formerly used in the thermal unit. A summary of the time efficiency of the plant is given in Table No. 1.

In contrast to the constancy of the mechanical operation of the unit to date, a variety of charging stocks have been processed to fill the needs of the refinery. Although the unit was designed to process tar separator overhead material from reduced crude in a once-through cracking operation, various deviations from the designed processing plan have been made. For example, straight run naphtha has been processed along with the tar separator overhead charge, both the light and heavy catalytic gas oil fractions have been recycled internally and for several days whole crude was charged to the vaporizing heater.

All of these changes in charging stocks were made without interrupting the continuity of operation of the unit and demonstrate the extreme flexibility of the TCC process in this regard. The charging of whole crude to the TCC plant was a particularly advantageous procedure since it enabled the TCC unit to continue the production of marketable petroleum products during an emergency period when the crude unit in the refinery was forced off stream for repairs. Not only have many types of charging stock been processed in the TCC reactor but also the charging rates have been varied over a considerable range for experimental purposes to determine the flexibility of the unit. For example, the recovery section of the plant was revamped to handle a daily production of approximately 1,300 barrels of ten-pound motor gasoline but the production of specification gasoline has actually been as high as 1,900 barrels per day.

In Tables No. 2 through 4, summaries which are typical of the TCC unit operation on several of the charging stocks and processing schemes men-

tioned above are presented. These data were chosen at random from the daily log of the plant. Octane ratings of the as-produced gasoline would have been higher had it been possible to exclude several percent of straight-run naphtha overlap from the charge to the reactor. This was impossible because of limited crude fractionating facilities.

Operations in which the heavy catalytic gas oil or synthetic crude tower bottoms fraction was recycled internally as illustrated in Table 4 are not generally advisable, due to the high coke and low gasoline yields, but at times it has been judicious to conduct such an operation in order to obtain products from the synthetic crude fractionating tower of certain boiling ranges. The most significant comment to be made about this operation is that, in spite of a sharp increase in coke production, there was no difficulty in continuing the smooth operation of the catalytic section or in removing the high coke deposit from the catalyst in the regenerating kiln. Incidentally, the recycling of catalytic gas oil or synthetic crude tower bottoms is an efficient means of augmenting the refinery steam supply. The production of steam in the TCC kiln from the combustion of the coke deposit is accomplished at practically 100 per cent heat utilization in contrast to a much lower fuel economy which would result from using the synthetic crude tower bottoms fraction as fuel in the refinery boiler plant.

During the period from April 22 to 25, 1947, raw, desalted Adams crude was charged to the vaporizing heaters and flashed in the tar separator to produce a tar separator bottoms fraction of 10 to 11° API gravity. The overhead from the tar separator flash, which contained all the straight-run gasoline, naphtha and kerosene in the crude, was cracked in the reactor and processed in a conventional manner. A high yield of relatively low octane motor gasoline was produced due to the presence of the straight-run gasoline in the charge. On the other hand, because of the desulfurization imparted to the straight-run gasoline in the cracking operation, the lead susceptibility of the as-produced gasoline was very good, so that it was possible to prepare an acceptable gasoline product with the addition of 3cc TEL per gallon. The tar separator bottoms production from this operation was subsequently processed to marketable asphalt.

One of the factors which has contributed greatly to the maintenance of excellent product distribution from the operation of the plant is the high level of catalyst activity which it has been possible to maintain with catalyst make-up rates of the order of one ton per day. The catalyst make-up to date has been only that required to replace "fines" elutriated from the system and to compensate for normal catalyst shrinkage.

Flow diagram of Leonard TCC Houdry Unit.

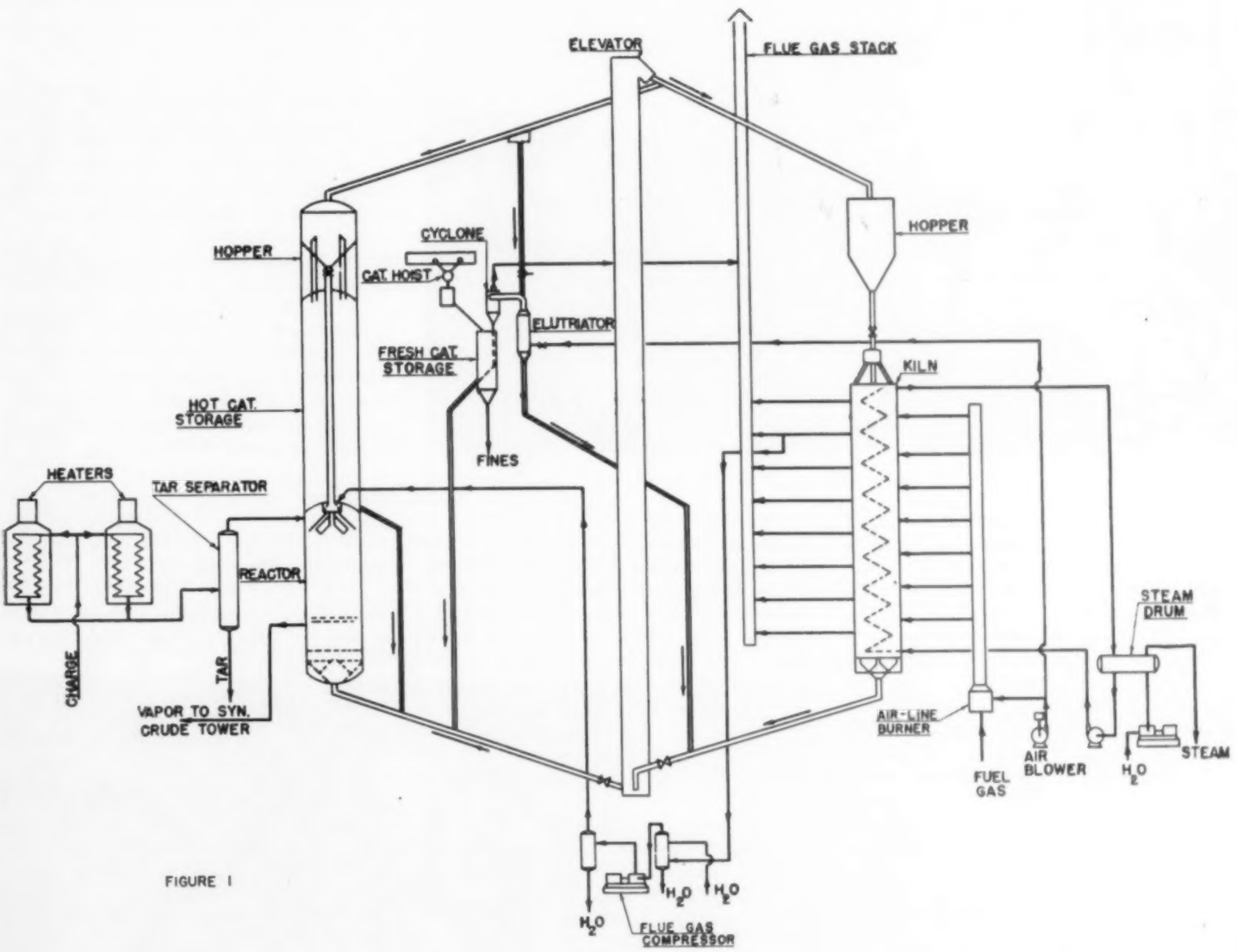
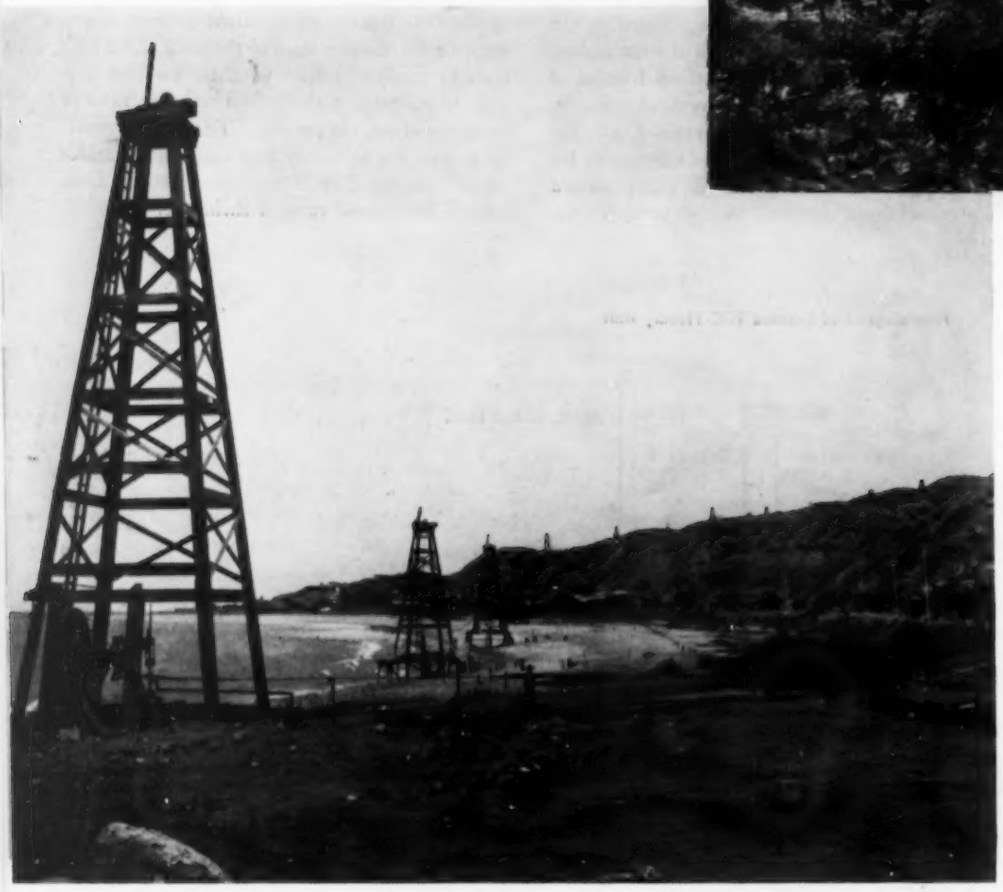


FIGURE 1

PERU LOOKS TO EXTENSIVE OIL DEVELOPMENT

By Dr. J. E. Rassmuss

Aerial view of well in the Peruvian jungle. ↑



← Zorritos field operated by Peruvian government. Photo by Collier for Standard Oil Co. (N. J.)

ALTHOUGH at present the center of interest of the oil world seems to be the development in the Middle East with its high potential reserves and low cost of production, increasing demand in the United States and the rapidly progressing industrialization in South America, aside from the still uncertain political situation in Europe and the Far East, make it inadvisable to neglect the more immediate resources of the Western Hemisphere.

In South America where exploration for oil is now active, Peru possesses probably the largest reserves of prospective oil lands. The Montaña, the basin of the Amazon River, beginning from the thousand meter level in the Eastern Cordillera, comprises an area of about 60 million hectares or roughly 148 million acres; the coastal region in the north between Lambayeque and Tumbes covers more or less three million hectares or 7.4 million acres. From all this area in the coastal region the International Petroleum Co. has been granted 166,456 ha in the Brea-Pariñas concession, of which 6,828 ha are in exploitation. The Lobitos Oil Fields, Ltd. in the north of Brea-Pariñas has 56,544 ha of exploitation concessions. The Sechura reserve zone, amounting to some 2,240,000 ha, covering mostly the Sechura desert, has been applied for by the International Petroleum Co. through a special contract which is still awaiting approval by Congress.

In the Montaña the Ganso Azul Co. holds a concession of 30,000 ha, from which was produced last year only 89,236 barrels for local consumption, because of the lack of transportation possibilities for export, but having a much higher potential yield. The Compañia Peruana del Oriente owns several concessions with a total surface of 138,536 ha and is just completing the first well near Orellana on the Ucayali river. The government has started drilling of its first exploration well at Santa Clara farther north.

Crude oil production in 1946 amounted according to official statistics to 12,468,126 barrels. Of this 80.38 percent was produced by International, 17.92 percent by Lobitos Oil Fields and 0.98 percent by government exploitation in Zorritos and Los Organos, plus natural gasoline production amounting to 1,041,407 barrels, of which almost 90 percent proceeded from International and 10 percent from Lobitos Oil Fields.

Exploratory drilling by the government in the Titicaca region, where old wells yielded some 300,000 barrels, has so far been unsuccessful because of the upset structure.

Peru's domestic consumption amounts to about 40 percent of its production or roundly five million barrels.

As indicated above, a very small proportion of Peru's potential oil-bearing area has been developed. The Montaña, which belongs to the large belt of oil-bearing formations extending along the eastern slope of the Andes from northern Argentina through Bolivia and Peru to Colombia and Venezuela, offers favorable prospects as regards the yield and grade of the oil. The latest well in the Ucayali region struck oil with an initial flow of 3,700 barrels. Wells in this area are shallow, varying from 1,000 to

1,500 feet. The quality is excellent, ranging over 44° API, and the sulfur content is low.

Extensive preliminary exploration work by aerophotogrammetrical surveys and geological studies has been executed in the past few years by major oil companies, including Standard of New Jersey, Shell, Socony and Gulf. Several million dollars have been spent, but no formal application for concessions has been made until now, pending the outcome of the new oil law.

This project of law, prepared by Arthur A. Curtice of Hoover, Curtis and Ruby and based somewhat upon the Venezuelan law of 1943, considers every possible facility for private investment and warrants equal rights to foreign capital. It has been the intention of the government to work out the new law in close cooperation with the private companies. For that reason Mr. Curtice's project has been submitted to the representatives of all national and foreign oil companies established in the country to gather further information and proposals regarding its provisions.

In view of the heavy investment required for oil development in the Montaña, because of the natural difficulties, the new project of law has not limited the extension of the concessions. The area is divided into quadrangles of 30° latitude and longitude, which represent the units of exploration (approximately 300,000 ha each). The number of these areas to be petitioned for exploration is not limited. Exploitation parcels, covering quadrangles of 5° each, can be freely selected from every unit, amounting to a maximum of 50 per cent of the total area of the exploration concession.

An extension of three million hectares (7.4 million acres) for exploration may be estimated to warrant the necessary area for a production of 100,000 barrels daily with the reserves for a continuous development over a number of years. Larger areas may be granted under the same conditions.

The terms for exploration will exceed considerably those of the Venezuelan law, allowing all necessary time for scientific survey and drilling, extending over a total period of nine years. The exploitation period of 50 years is estimated to cover long-term production and amortization of the invested capital.

Surface taxes are set at moderate rates during the time of exploration, increasing only if the concessions are held purely as reserves. Royalty in the coastal area is fixed at 16⅔ percent, corresponding to Venezuela's requirements; in the Montaña 12½ percent is charged. No other charges such as exportation duties or similar taxes are to be imposed during the term of the concession. Partial release from duties on imports of equipment is contemplated.

A fair depletion allowance is proposed to be established for the first time in Peru in the assessment of income tax.

Special concessions for refining or transportation which are included in the surface concession may also be granted separately.

As transportation of the oil of the Montaña is possible at present only on the navigable rivers, affluents of the Amazon, construction of a pipeline to the Pacific Coast has to be considered for commercial exploitation. The length of a pipeline from the northern part of the Montaña to the port of Bayovar on the Pacific coast would be about 300 miles. The elevation to be passed in this part of the Cordillera de los Andes amounts to some 7,000 feet, substantially that of the line leading from the Barco concession in Colombia to the Caribbean Sea. Because of the high grade of the oil, pumping stations would be required only in the eastern part of the pipeline up to the summit of the crossing of the Cordillera, thence flowing down by gravity.

The new project of law will be considered by Congress at the current July session.

Peru offers, undoubtedly, very favorable prospects for new developments and commercial exploitation on a big scale with the possibility of reaching a production of 500,000 barrels daily in the future and possibly becoming the largest producer on the Pacific coast.

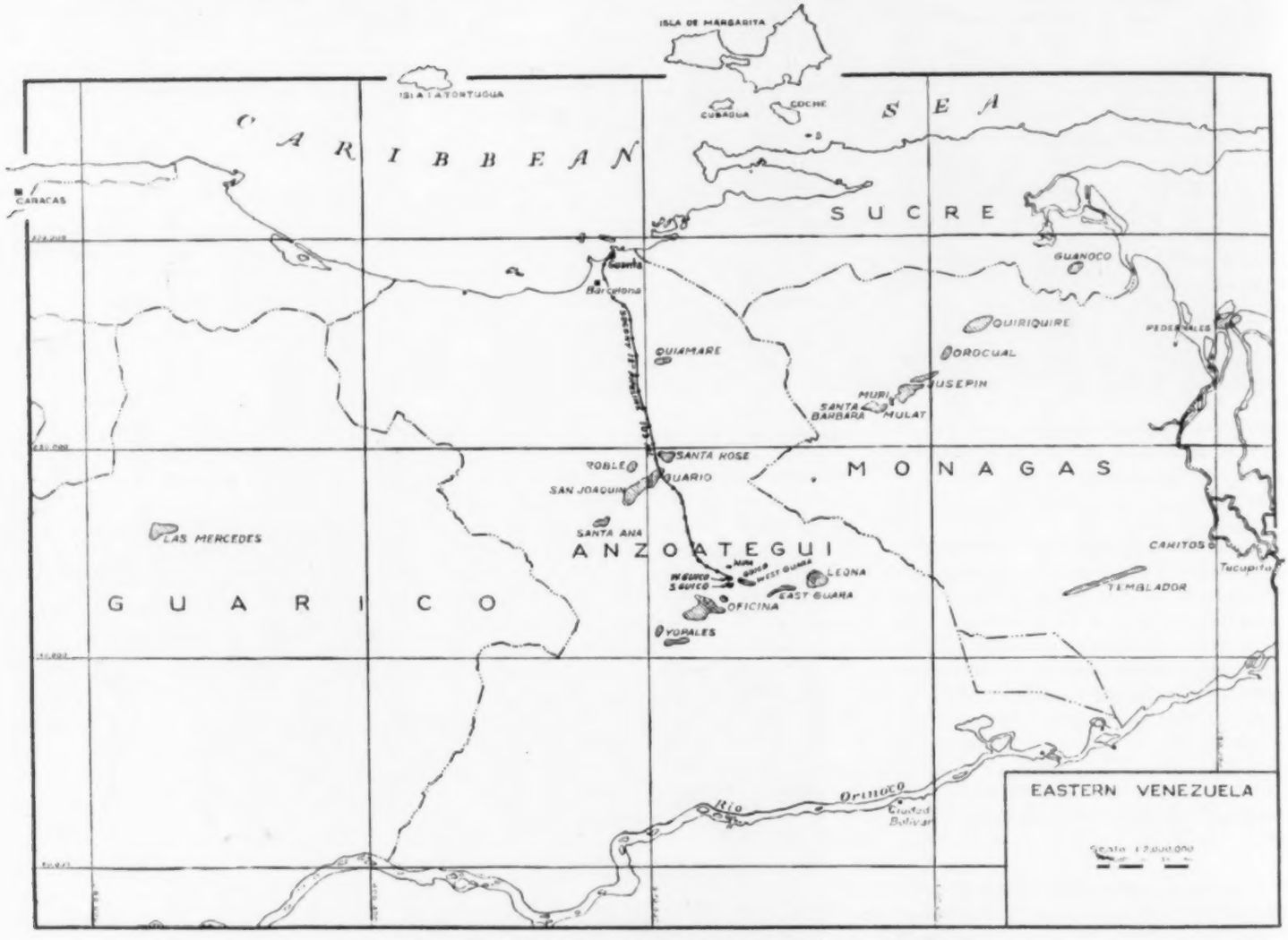
Very large investments certainly are necessary at the beginning, but with the expectation of promising results, not only the major companies but also the independent producers may find there a prosperous field for their activities, protected by a fair law. Investors have become interested lately in even more remote areas such as those on the eastern slope of the Bolivian Andes. Panamerican cooperation, to be established more closely at the next conference in Rio de Janeiro, should also be extended to the oil exploitation so indispensable to the welfare and to the protection of the American Nations and the raising of living standards in South America.

Deep test in the Negritos field drilling at 9800 feet, deepest well thus far drilled in Peru.

Tankers loading at Talara docks. British Combine photo.

One of Panagra's "flying boxcars" loading at Lima.

SOCONY EXPANDING VENEZUELAN OPERATIONS



Map showing route of Socony's new pipe line from the Guico fields to the Caribbean.

TO handle the increased production of its producing properties in Eastern Venezuela, Socony-Vacuum Oil Co. has laid a 103-mile pipeline from West Guico to a tanker loading terminal on the Caribbean at Guanta. The main line is built of 12-inch pipe from the tank farm and main pump station at Anaco and connects with the Guico field stations.

Aside from field pumping stations which boost oil from lease storage to Anaco, only one pump station is required. Elevation of the field pump station at West Guico is about 930 feet, and from a nearby point where the elevation is 1,015 feet the line drops all the way to the coast, so there is some gravity flow of oil. Initial capacity of the line with present pumping equipment is about 45,000 barrels daily, but this can be enlarged readily to about 70,000 barrels by adding more pumps at Anaco.

Except for stream crossings and at a few other points, the line was laid on the surface where it may be maintained more cheaply. A telephone system has been installed in connection with the line.

Until the line was laid, Socony-Vacuum used pipeline facilities of its neighbor, Mene Grande, to pump oil to the coast. The Mene Grande line has not been large enough this past year to handle all of the oil tendered. So at times production has had to be restricted to line capacity.

Lack of pipeline capacity has not restricted either exploratory or development drilling. In Eastern Venezuela proper the company is running 10 drilling rigs and four work-over rigs. This is in addition to one rig engaged in exploring the Barinas exploration concession in western Venezuela. In 1946 Socony drilled 36 wells in Venezuela including three in Barinas. This compares with 20 wells drilled in 1945. Although currently producing only three percent of Venezuela's oil, Socony is operating more than ten percent of the drilling rigs in the country.

Socony is one of the newer operators in Venezuela. First concessions were taken only ten years ago. Discovery well on Socony properties was brought in on September 30, 1940, in the Guario field of the San Joaquin district. At the end of 1943 the company's cumulative production was only 356,000 barrels. In 1944 production was 1,027,000 barrels; in 1945 it totaled 4,088,000 barrels, and last year it doubled again, reaching 8,108,000 barrels.

Just prior to the opening of the new line, production of the company was running about 30,000 barrels daily.

Before its Guario discovery in 1940 Socony had drilled farther south some wells toward the Orinoco River, but these were not considered commercial because of the heavy oil which is

almost impossible to produce or handle because of its viscous character.

In the Guario field proper Socony now has 18 producing wells on a single structure of the general San Joaquin uplift, which is known to extend some 20 miles in a northeast-southwest direction from Santa Rosa to Santa Ana. The Guario field in its present stage of development extends at least four miles on this general axis but has not been fully defined. Two other producing wells on this general trend have been drilled, but geologists are not sure whether they constitute new domes with separate closures or are extensions to Guario.

There are 13 oil sands in the Guario field, and most of the wells have been completed in two zones. Socony has not employed triple zone completions to which some companies resorted as a war-time expedient to get out more oil from the same number of wells. Deepest producing sand is found at 9,500 feet and the shallowest at 5,500 feet. There is some faulting in the field but not to the extent found in Guico and elsewhere in the general area. At the present time Socony is running one drilling rig and one workover rig in the Guario field.

Crude from the Guario field averages 43°-44° API. It is a high wax crude with a cold test of 86°F. Current Socony production in the field is 6,400 barrels daily.

Currently Socony's most prolific producing

Socony's discovery well in the Guario field.

The new 12-inch line is laid above ground most of the way. Photographs with this article were taken by John Sheldon, son of Waldo Sheldon of Socony's foreign production department.

property in Venezuela is its 25,000-acre Guico concession block. This tract contains parts of four fields: Guico proper (West Guara), South Guico, West Guico and West Nipa. The four fields now are producing 24,000 barrels daily; 12,000 barrels from Guico, 5,400 barrels from West Nipa; 1,700 barrels from West Guico; and 3,600 barrels from South Guico.

All of the Guico district fields are highly faulted, the fault slippage running from 115 to 500 feet. Almost all of the oil is found on the north side of the faults. Fields have a combination of water and gas drive. At present all wells in the district are flowing, although gas lift is being resorted to in some wells. Of Guico-West Guara, Mene Grande has a considerable part, and there are discussions between the two companies for production methods on a cooperative, integrated basis.

There are 31 producing sands in the Guico field found between 5,500 and 7,600 feet. Only

Headquarters camp of Socony geophysicists in eastern Venezuela.

about half of the known sands are being produced now, although all wells are producing from two zones. Upper sands at Guico produce light crudes with a wax content of six to ten percent and a gravity above 40°. Lower sands produce heavier oils, the lowest being around 18°API. Average pipeline stream tests about 39°.

Three other producing areas on the Guico block include South Guico, West Guico and West Nipa fields. The South Guico field with eight wells is producing 3,600 barrels daily. One drilling rig is running. In West Guico two wells are being drilled, and five are producing 1,700 barrels daily. West Nipa is producing 5,400 barrels from eight wells, and two drilling rigs are active.

Near the Guaria field Socony found small deep production at Anaco. This well was drilled to 11,294 feet and has not been fully tested as yet. More drilling will be required in this vicinity. Socony also found gas in a wildcat at Tascabaña and is drilling a second well to test the acreage further for oil.

Two wildcats are being drilled currently on exploration concessions at a considerable distance from present production. One is in the state of Monagas some 60 miles northeast of Guico, and the other about 100 miles west of Guico between Las Mercedes and Atlantic-Pantepec's production.

One rig is running also on Socony's Barinas exploration concession. In this concession exploratory work is being pushed with all possible speed, because the company must relinquish much of the concession in the near future. The company has at times run five seismograph and one gravity meter crews on this concession.

VENEZUELA TO SELL ROYALTY OIL

IN furtherance of a plan which it has had under consideration for the past year or more, the Venezuelan government is asking for bids on the royalty oil which it owns under its contracts with concession-holding oil companies. Under the terms of these agreements the government is entitled to collect its royalty either in the form of oil or the cash equivalent. In practice the companies in the past have purchased the government's share of production, paying for it on the basis of the current Gulf Coast price for the same grade of crude less the difference in transportation cost.

With the present urgent demand for oil in international markets which has led to the payment of premiums above posted rates in some instances, Venezuelan officials apparently have formed the conclusion that they may be able to sell their oil on better terms than they now obtain. At any rate the Minister of Fomento has issued a resolution approved by the Council of National Economy asking that bids be filed by August 18 for oil to be delivered during 1948-49. In the language of the resolution, "Public bidding is opened to nationals or foreigners, natural or juridicial persons, whose habitual activities, exclusively or otherwise, are to deal with oil, for contracting the buying and selling of quantities up to a maximum of 25 percent of the total crude oil that can be demanded by the government from the concessionnaires of hydrocarbons, by right of the exploitation tax, on the production of the concessions between January 1, 1948, and December 31, 1949. The contracts may deal with all or part of the amount of oil at the disposal of the government in any receiving installation located in the section covered between the production field and the export terminal; but the negotiated quantities in all will not exceed the said maximum of 25 percent of all the oil corresponding to the exploitation tax during the indicated period of two years.

"The bids, sent to the Minister of Fomento in sealed envelopes, may be presented to the Technical Office of Hydrocarbons until August 18, 1947 at 10 A.M., date and hour set for public opening of the bids, to be presided over by the Minister of Fomento, and which will also be attended by Attorney General of the nation, the Comptroller General of the nation and the President of the Council of National Economy, or representatives duly authorized by them. Said bids must contain:

"(1) Name and address of the bidder, with a declaration that he knows all the conditions inherent to the manner in which the exploitation tax is collected by the government.
"(2) Quantities in volume, quality and place of delivery of oil in which the bidder is interested, indicating the periodicity of deliveries.
"(3) The premium that must necessarily be offered above the prices that, under similar circumstances the concessionnaires would pay for the oil if the collection of the exploitation tax were made in cash. To this end, the transportation charges from the production field to the point of delivery, under the care of the government, will be taken into account.
"(4) Capacity and draught of the tank boats that would be used, if the bidder were to ship the oil.
"(5) A surety bond for one hundred twenty-five thousand bolivares (Bs. 125,000) from a bank or insurance company, established in the country, to guarantee that the bidder, provided his bid is accepted, will sign a contract with the federal government for buying and selling the oil within fifteen days following the granting of the bid.
"(6) An authorized statement from a third party regarding the financial status of bidder and his experience in oil transactions, that will indicate his possibilities for fulfilling contract."

General terms governing the performance of any sales agreement that may result from the bidding are set forth in the statement of the Minister of Fomento, and prospective bidders are informed that contract forms are obtainable from the Technical Office of Hydrocarbons of the Ministry of Fomento in Caracas.

As Venezuelan crude production is now running some 1,100,000 barrels daily, and the average royalty rate is about 16⅔ percent, the government apparently controls some 180,000 barrels of daily production. As stated above, sales under the plan outlined are not to exceed 25 percent of the total quantity to which the government is entitled, but this represents roundly 45,000 barrels per day.

SINGLE COLUMN CATALYTIC UNIT INSTALLED AT DETROIT

FORTY representative refiners were guests of Aurora Gasoline Company at Detroit, Michigan, on July 17, to observe and study in operation the first commercial fluid catalytic cracking unit to be erected with reactor and regenerator housed in a single column. Following the inspection, the refiners were guests of Universal Oil Products Company, designers of the plant, at a luncheon at Dearborn Inn, Dearborn, Michigan.

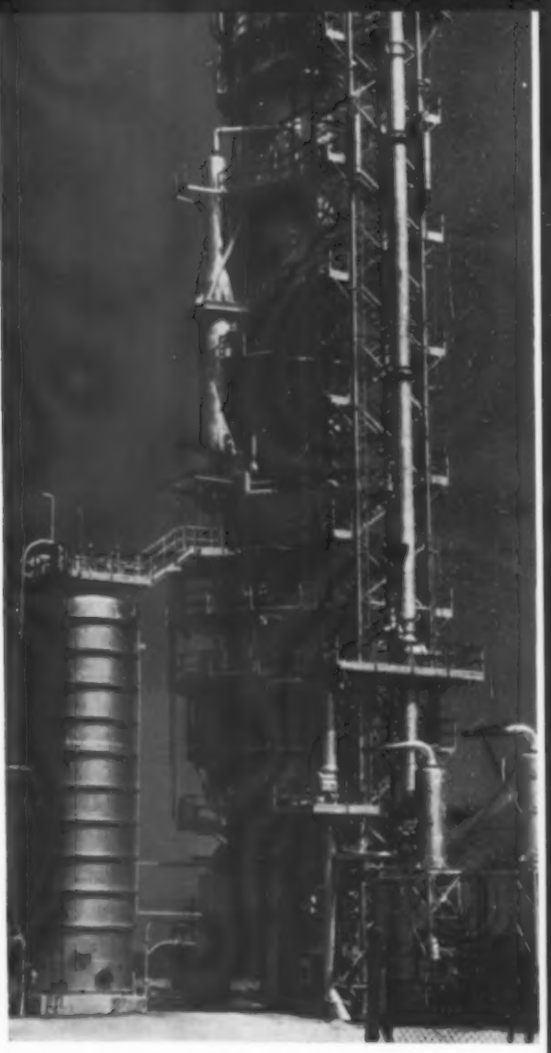
The Aurora Gasoline Company is the largest independent refiner in Michigan and the only one located in the City of Detroit. The plant processes 12,000 barrels per day of crude oil which comes by pipeline from Texas, Wyoming, Illinois and Michigan.

The new catalytic cracking unit was placed in operation June 10 and has been running continuously since that date, charging 3,500 to 4,000 barrels per day of 29-31° API gravity Illinois gas oil. Typical results during that period have been as follows:

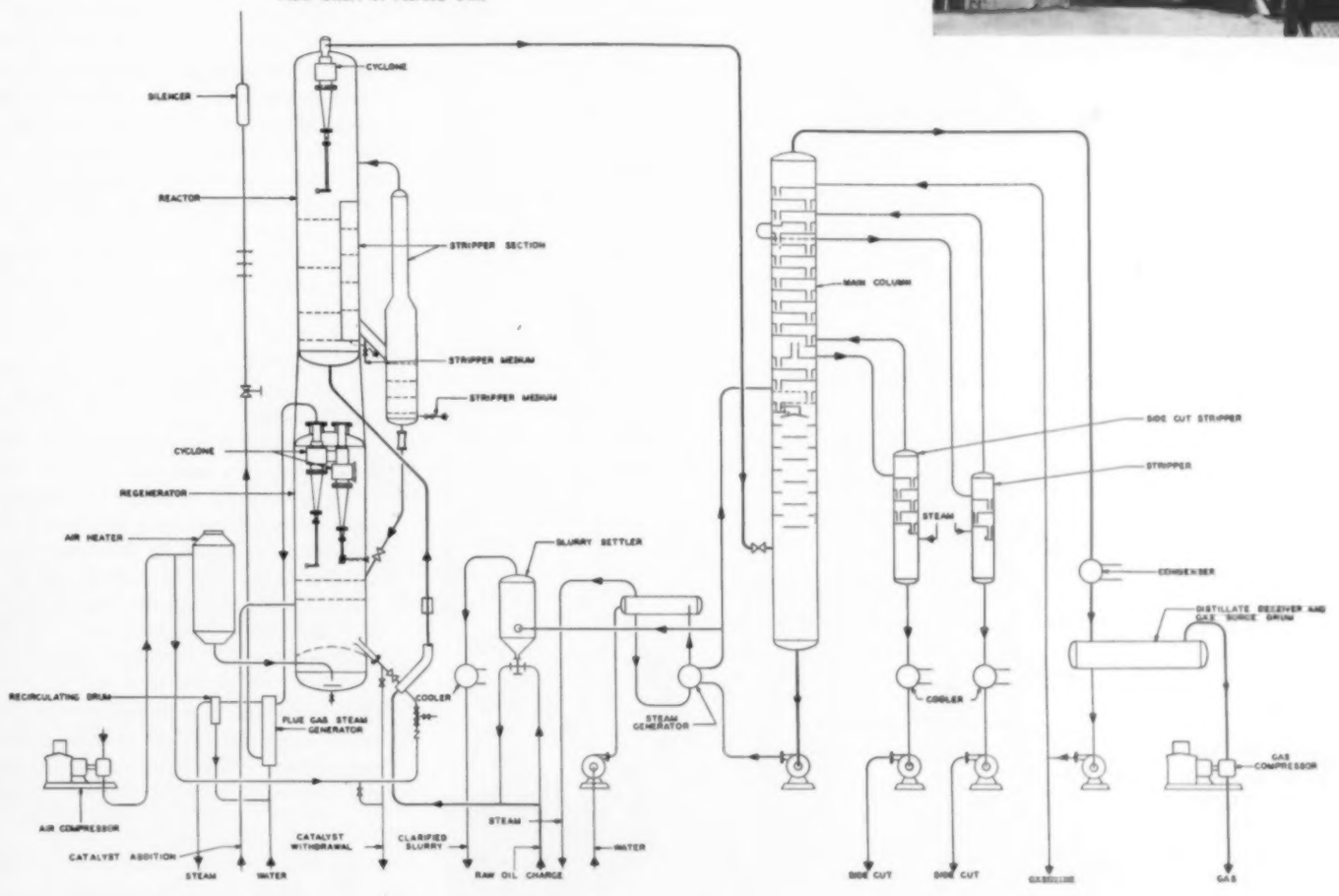
Charge Stock, BSD (29-31° API)	3,500-4,000
Conversion, 100-Vol. % cycle stock	50-53
Yields, % of charge	
Dry Gas, Wt. %	4.5-5.0
C_4, Vol. %	9-10
Debutanized gasoline, Vol. %	41-43
Heating Oil, Vol. % (580°F @ 90% Point)	28-29
Heavy cycle stock, Vol. %	18-22
Coke, Wt. %	4.5-5.0
Octane Numbers of Debutanized Gasoline	
F-2 clear (Motor)	78-80
+ 3cc TEL/Gal.	85-87
F-1 clear (Research)	90-92
+ 3cc TEL/Gal.	98-100

Early in 1946 Aurora management, recognizing the need for a catalytic cracking unit to place the

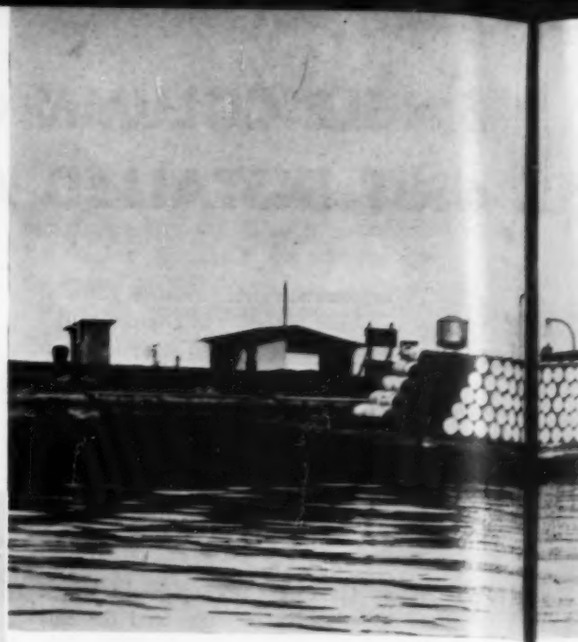
(Continued on page 71)



Flow Chart of Aurora Unit



MEXICAN OIL SITUATION HELPED BY SETTLEMENT OF LABOR ISSUE



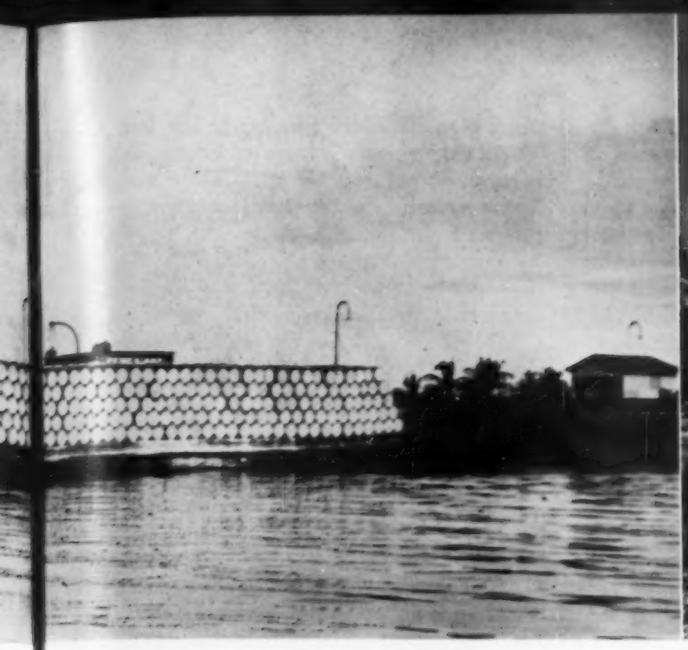
PETROLEOS MEXICANOS, the government-owned company that operates all but a negligible part of Mexico's petroleum facilities, is now in a position to conduct its activities on a sounder basis and with greater efficiency than ever before. This at least is the statement made by the management of the company and supported by the union of workers.

During nine turbulent years since the expropriataion of oil properties in 1938, the most troublesome problem confronting Pemex has been that of its labor relations. Successive demands for wage increases and other concessions, with frequent interruptions of work, have been blamed by company officials for unsatisfactory financial showings in past years. A particular bone of contention has been the question of dispensing with employees whose services were not required in the opinion of the management. The unions have steadily opposed any decrease in the number of workers.

When Gen. Antonio Bermudez became managing director of Pemex, he promptly made it clear that the company would be administered in line with President Aleman's policy of putting Mexican industry on a more efficient basis. While assuring the workers of his intention to treat them with absolute fairness and to extend further advantages as circumstances permitted, he pointed out that wages must be paid for out of production and that maintenance on the payroll of surplus employees operated to prevent the company from attaining a sound financial position.

Some of the more radical unionists were not convinced of the necessity of modifying the Pemex organization. They declared that so far from operating in the red, the company actually had

← Drilling well in the Poza Rica field.



Oil barge on the Panuco river at Tampico.

Hauling crude by tank truck is slowed by necessity to wait for ferry over unbridged stream.

a profit of 22,000,000 pesos in 1946 and that consequently there was no need of reducing the number of employees. Several sporadic strikes occurred, but these were dealt with promptly and decisively, and it was made evident that the director of Pemex was determined to adhere to his position and that he had the full backing of the President.

All the issues involved have now been settled to the apparent satisfaction of all concerned, as the result of the report of a Mixed Conciliation Committee for the Reorganization of the Petroleum Industry of which Lic. Ramirez Vazquez was chairman and by the adoption of a new contract effective June 1, which modifies some clauses of the agreement that has been in effect since 1944 but retains several of its provisions.

Findings of the committee, arrived at after an intensive study of the situation, were that while Pemex was faced with financial difficulties, these could be overcome by the adoption of a new working agreement and by economic expansion of the industry. The committee held that enlargement of exploitation activity to increase the nation's oil reserves was essential and that development of the industry had been held back by deficiency of funds due to administrative expenditures that were excessive or unjustifiable. There must be a large investment in new facilities, especially refineries, in accord with recommendations by experts in the technical, industrial and commercial branches. The committee suggested that plans for expanded operations would insure retention of a high percentage of regular employees, but that some readjustment of transitory workers might be necessary.

Features of the new labor contract concluded between Pemex and the unions follow:

Pemex shall consider with the union representatives any matter they present, and if within eight days from the presentation, adjustment is not reached, the matter shall be submitted to the National Agreement Committee that is being organized, which must decide the case within 15 days. The Agreement Committee has these functions: to foresee conflicts that can arise; conciliate individual and collective conflicts, including sit-down strikes and full strikes. Its decisions will have full legal validity and it is obligatory that both parties to a conflict accept the committee's rulings. When the committee does not render a decision, both parties can recur to the labor courts.

Definite vacancies of surplus unionized workers will not be filled, and these jobs will be suppressed. Other vacancies will be filled by surplus personnel. Pemex has the right to perform itself or by free contract social works, construction of houses and other buildings, urbanization and sanitation, construction of pipe lines, gas lines and refineries, facilities for transportation and distribution, exploration and well-drilling works. The company may also move its workers to any part of the country by paying their fares. Pemex must provide up to 200,000 pesos annually for the payment of salaries, house rents and savings fund for 36 union officials.

Pemex is allowed to readjust a minimum of 11 percent of its permanent confidential employees, and just who among its workers must be regarded as surplus will be decided by agreement between the company and the union. A company-worker committee will be appointed to discuss clauses of the new contract. If this committee fails to agree, the matter will be decided by the Federal Board of Conciliation and Arbitration.

The agreement is hailed as allowing Pemex recovery of autonomy in its management and is estimated to signify an annual saving to the company of 45,000,000 pesos, besides liquidating all differences that had existed between the company and its employees and fixing the bases for future employer-employee relations.

Gen. Bermudez asserted that this agreement will "realize President Aleman's petroleum plan," and the union hailed it as the "end of the economic conflict."

"With the signing of this agreement," said Gen. Bermudez, "the economic confiict has been settled satisfactory for the interests of the country and those of both factors of production. The patriotic attitude of the workers and the intelligent intervention of the representative of the President of the Republic made possible the successful conclusion of the work of the Mixed Conciliatory Committee and fixed a firm base for the development of the industry. It will now be possible for the workers and the Administration to work together in a cordial atmosphere in which all are consecrated to work for the advancement of the industry without wasting time and resources in discussions and sterile conflicts. It is but just to recognize the efficient collaboration rendered by the technical personnel of this institution. The contract has been revised with the modification of all clauses that constituted an obstacle to the progress of the industry and a source of constant discord. The new contract should realize President Aleman's development program. Just and equitable salaries have been provided for various classes of workers, and the old conflict of wage balancing has been definitely liquidated. Provision is made for the readjustment of transitory workers, and the moving of surplus workers to different work centers is permitted. The readjustment applies to both unionized and confidential personnel and represents a saving of millions of pesos, the amount of which will be known soon. Besides it constitutes a great step in the reorganization, for it allows using surplus personnel in new works and redistributing them to present work centers so as to obtain better results.

"One of the most valuable results was the creation of the National Agreement Committee to foresee and conciliate individual and collective conflicts, thereby making possible the maintenance of harmony in employer-employee relations."

The union position is defined as follows:

"The spirit of conciliation of the two parties was made manifest with the resolution attained. The President's representative rendered a splendid service. The economic conflict that Petroleos Mexicanos provoked last December has ended. There will be no readjustment of unionized regular personnel. It is true that Petroleos Mexicanos is authorized to readjust unionized transitory personnel; but it must be considered that most of those workers are necessary as substitutes. But on the other hand Pemex is obliged to readjust within 60 days 60 percent of this confidential employees, as well as all nonessential transitory confidential employees. Pemex also recognizes the number of officials of each section that it pays on its own account. Besides the agreement allows us a small wage increase—15 percent in zones other than the central zone (Mexico City). We agree to the formation of four committees: a permanent one, the mixed agreement, to handle all conflicts that arise in the future, serving as a private court of last appeal; the others are temporary, one to apply wage scales, classify workers and install the regulations of their respective services; a second that has charge of the discussions of the 30 clauses of the collective contract that Pemex wants to modify; and a third to determine who of the personnel shall be considered as surplus in the sense that they shall continue working at their same wage rates, but when there is a vacancy, the company is free to fill it or not with a surplus worker.

"Our collaboration also consisted in granting the company's request for changes of clauses concerning the union's jurisdiction over company affairs and in the construction of additional works. We agreed that the union's jurisdiction be limited to operation and maintenance activities, leaving the company free in the development of additional works with elements it chooses, but that perference be given union members who demonstrate their competence.

"The life of each temporary committee is 90 working days. It is provided that if they cannot reach an agreement, the matter will be presented to the Federal Board of Conciliation and Arbitration. But we do not consider that extreme will be necessary because the pending clauses are of minor importance. One of the most difficult is that concerning confidential employees. But the company has agreed to readjust 12 percent of its confidential employees and not to increase the number of those positions."

The new collective labor contract with Pemex was "unanimously accepted by all sections," declared the union, asserting that not a single section can oppose the agreement because they all approved it through their representatives on the commission that arranged the pact. The union branded "untrue" stories published by some Mexican newspapers that several sections oppose the pact, some because they consider that it "deprives the workers of their conquests," others because of the contract's provision for the readjustment of surplus workers and confidential employees.

Subsecretary of Labor Ramirez Vazquez called "false rumors" published reports of agitation among the oil workers because of the new contract and asserted that "tranquility reigns in the oil union." He attributed the "false rumors" to certain persons who formerly "selfishly enjoyed the benefits of contracts the company awarded private interests."

"Now that the conflict is ended," says Gen. Bermudez, "we must get down to work. There will be well drillings to increase oil production and reserves. Pipe lines will be built as the most convenient means for moving combustibles and aiding the railroads in their transportation problems. Gas lines will be built so that this great national wealth shall not be dissipated and to bring that combustible to industrial centers. Contracts have been signed for a gas line from Reynosa to Roma and from there to Monterrey. Studies are being made for a gas line from Poza Rica to Mexico City. Refinery construction has been concentrated on that at Salamanca, Guanajuato, as it will be of great importance in supplementing Azcapotzalco (Mexico City), correcting any deficiency that arises. A refinery will possibly be built at Guadalajara, Jalisco, (Mexico's second largest city, in the far west,) because both refineries will have different purposes in the matter of consumption.

"The projected refinery at Salina Cruz, Oaxaca, (on the Pacific, southwestern Mexico's principal port,) will be a sort of auxiliary to Minatitlan (on the Vera Cruz Gulf coast) to Salina Cruz pipe line. It is also proposed to install a distillation plant in the refinery at Ciudad Madero (Tampico,) Tamaulipas, and a fine lubricants plant at Azcapotzalco.

"These works will require from two to three years. For the execution of most of them, Pemex will use its own economic resources and for the rest by financing that the administration of the oil industry will obtain."

Bermudez detailed Pemex's employees at present as: regular, 20,000; transitory, 5,000; and confidential, 1,300. Studies for readjustments of unnecessary personnel are being made.

Construction of the Poza Rica-Salamanca pipe line is being pushed, and a commission of Pemex executives has gone to the United States to acquire machinery for that work.

Since Gen. Bermudez took charge last Dec. 1, Pemex has progressively improved its gasoline distribution throughout Mexico. There are no longer the numerous complaints of shortages of gasoline for motorists, industry and agriculture. Monterrey will have abundant supplies of Mexican natural gas starting in mid-September, Pemex announces, thanks to arrangements made with the Cia. Mexicana de Gas to provide that fuel from the Mission field in northeastern Mexico. Pemex counts upon a 40,000-barrel daily gasoline production by the Salamanca refinery, an abundant supply for central Mexico.

Union leaders, headed by Secretary General Antonio H. Abrego, assured President Aleman during the special interview he granted them that the oil industry will be in a flourishing state within two years, if there is strict adherence to the new contract and if exploration, drilling and exploitation works are pushed.

In view of the increase in domestic demand, there are frequent assertions that it will be necessary to suspend exports, excepting in cases of international obligations. Gen. Bermudez recently announced that 800,000 barrels a month are being exported, mostly to Italy, France, the United States and Cuba. He added that these shipments have been made for some time. Excelsior quoted Pemex officials as saying, "If exports are suspended, from where will come the 100,000,000 pesos a year they represent, and what will we do with the products that the country doesn't use?" Gas oil was mentioned as one of these prospective surpluses.

Pemex is to provide 2,000,000 pesos for the establishment for the first time in Mexico of a school of petroleum engineers that will be a feature of the University City the National University of Mexico is building in Mexico City. The school will prepare engineers versed in all phases of the oil industry from geology to refining, Bermudez announced.

The 64 independent oil producers now operating in Mexico are to be better paid by Pemex for their oil—43 cents (U.S.) per barrel, Pemex has announced. Some of these operators have a participation in wells that Pemex exploits; while Pemex participates in wells these operators exploit but the oil of which Pemex buys. When Pemex started after the 1938 expropriation, it paid the independents 35 cents per barrel. The rate is now 42 cents. It is estimated that Pemex will obtain 100,000 cubic meters (629,000 barrels) monthly from the independents and that the higher rate they receive for their oil will enable them to push exploration and drilling.

The government announces that it has started to pay "adequate royalties" to owners of oil lands that Pemex has worked since March, 1938, when the major foreign companies were expropriated. These royalties amount to about 30,000,000 pesos.

International News and Notes

Elmer Weis

Returns From Europe

Elmer Weis, vice president of Pacific Pumps, Inc., Los Angeles, has returned from a three-month trip to England, France and Holland where he visited oil refineries. Earlier in the year Mr. Weis made a similar trip through Latin American refining centers. On the two trips he traveled 18,000 miles.

Engineering Centre in Glasgow

Sometime in September an Engineering Centre is to be opened in Sauchiehall Street, Glasgow, Scotland. The Centre is designed to be of service to business men and particularly to visitors from overseas. Gordon Jackson is managing director, and D. I. Leslie Doran has been appointed technical director with the particular task of organizing the advisory service which is to be a special feature of the Centre's operations.

Polish Oil Operations

Poland's production of crude oil in 1946 as reported by Foreign Commerce Weekly was 860,000 barrels, while crude imports were 147,000 barrels. Imports of finished products included 1,408,000 barrels of regular gasoline and 79,000 of aviation fuel, 806,000 barrels of kerosene, 599,000 to fuel oil and 164,000 barrels of lubricants. Forty-five wells were drilled during the year, of which 35 were productive and 10 were dry holes.

John Lamb Awarded O. B. E.

In recognition of his work during the war in connection with tanker operations of the empire, John Lamb, manager of the technical division of the marine department of Anglo-Saxon Petroleum Co., has been awarded the Order of the British Empire. Except for a short period as director of a firm of naval architects, Mr. Lamb has been with Anglo-Saxon since the close of World War I. Having served on seven ships lost to enemy action in the first war, Mr. Lamb devoted much of his thought and energy in the more recent war to the safety of seamen.

J. A. Oriel Honored

J. A. Oriel, chief chemist and general manager of "Shell" Refining and Marketing Company, London, was cited in the Birthday Honors list as a Commander of the Order of the British Empire. The citation was in recognition of Mr. Oriel's work during the war in connection with the construction of the aviation gasoline plant at Thornton and the construction of the British pipeline network linking various sections of the country.

Mr. Oriel saw service in World War I. After leaving Cambridge, he joined Anglo-Mexican Petroleum Co. He served as manager of the refinery at Shell Haven in Suez and at The Hague. In 1938 he was appointed manager of "Shell" Refining and Marketing.

To Manage Grangemouth Refinery

Dr. W. B. Peutherer, Ph.D., has been appointed manager of the Grangemouth refinery of Anglo Iranian Oil Co. He succeeds J. G. Annan who retired on March 31 after 40 years' service with the company.

It was in 1907 that Mr. Annan joined Young's Paraffin Light and Mineral Oil Co. as assistant chief chemist at the Addiewell works. He was made chief chemist there in 1912 and in 1920 was transferred to the Uphall refinery, becoming latterly assistant manager and chief chemist. In 1924 he was transferred to Grangemouth as chief chemist and five years later was also made manager.

H. H. Hall

Director of Trans-Arabian

H. H. HALL has been named a director and vice president of Trans-Arabian Pipe Line Company and will devote his time to the planning and construction of the projected 1,050-mile Arabian pipe line. He has been Standard of California's chief engineer and under the new set-up is given the title of consulting engineer for Standard. Mr. Hall joined Standard in 1910, following three years in the Alaskan gold mining industry.

Anglo Iranian Appointment

V. T. Millington has been appointed commodore chief engineer of Anglo Iranian Oil Company's fleet, a newly-created position in the company. He advances from senior post chief engineer, a position he has held since 1942. After several years afloat Mr. Millington joined Anglo Iranian in 1918 as third engineer and was appointed chief engineer a year later.

Australia Drilling Program

Thirty test wells will be drilled in Queensland by Shell Development Pty. Ltd., it was announced recently by E. N. Avery, acting general manager. Two areas have been selected for search on the basis of geological studies conducted before the war. The 30-well program will require some four years for completion, since tests are to be drilled to 10,000 feet or more if necessary. An appropriation of $4 million has been set aside for the search.

New Norwegian Tanker

The M/S Svenör, a new motor tanker ordered by S. Ugelstads Rederi A/S, Oslo, went on trials recently from the Eriksbergs, Mek. Verkstads Aktiebolag, Gothenburg. The M/S Svenör is the sixth vessel delivered to Norwegian owners since the war. It is the third of the same type, of which there are further about 10 vessels on order.

The M/S Svenör is built with two continuous longtitudinal bulkheads and has nine center tanks and ten wing tanks. Capacity of tanks is 738,000 cubic feet. Loaded speed of tanker is 14 knots.

Hayward Tyler Pump

In the May issue of WORLD PETROLEUM a new-type electromersible circulating pump manufactured by Hayward-Tyler & Co., Ltd., Luton-Bedfordshire, England, was described. It was stated in this description that the pump was "installed in a bulge in the boiler." Actually the pump is installed in an extension of the water tubes and is not actually in the boiler itself. Necessity for heat dissipation prevents placing the pump in the boiler. The pump and motor operate under full water pressure existing in the boiler and avoid high pressure, high temperature stuffing boxes which are costly to maintain. The pump operates at boiler temperatures, while the motor windings are kept below 130-140°F. by restricting the flow of heat from pump to motor and by passing cooling water through the rotor windings and the rotor gap.

To Drill In Syria

According to a report to Foreign Commerce Weekly, the Syrian Petroleum Company, Ltd., has completed preparations for drilling three test wells in the neighborhood of Aleppo, one at Kurt Kulak, one north of Aazaz and a third south of Afreen. A base camp has been established, and drilling machinery has been shipped in. The company is one of the Iraq Petroleum group and holds a concession for 75 years from the government of Syria.

Venezuelan Production

Production of crude oil in Venezuela during the month of May amounted to 34,904,472 barrels, an average of 1,125,951 barrels daily. This daily average is 17,300 barrels less than during April. Exports for the month were 33,079,771 barrels. Production by companies is shown in the following table:

Company	West	East	Total
Creole	12,557,834	4,659,342	17,217,176
Meneg	1,805,739	4,525,252	6,330,991
Shell	9,624,098	—	9,624,098
Consolidada	—	651,325	651,325
Socony	—	806,473	806,473
Texas	—	218,725	218,725
S.A.P. Las Mercedes	—	10,646	10,646
B.C.O.	33,786	—	33,786
Orinoco	8,038	—	8,038
Phillips	—	1,761	1,761
Varco	—	1,453	1,453
Total	24,029,495	10,874,977	34,904,472
Exports			33,079,771

OIL COMPANY STAFF CHANGES

N. H. Angell

J. M. Evans

N. H. ANGELL has been appointed manager of the asphalt division of Standard Oil Co. of Calif. Mr. Angell joined Standard in 1922 as an engineer in the fuel oil and asphalt division, and has been in the asphalt branch of the company ever since—a total of 25 years. During 1940 he was civilian consultant on construction of the asphalt airfield surface on Midway Island. This field is considered to be the first airstrip built using coral aggregate instead of crushed rock.

GEORGE G. OBERFELL was awarded an honorary degree of Doctor of Science at the University of Tulsa's commencement. Dr. Oberfell is vice president for research of Phillips Petroleum Co., Bartlesville. In World War I Dr. Oberfell was in the chemical warfare service. He joined Phillips in 1925 after serving Chestnut & Smith Corp. as research engineer and spending a brief period as a consultant. He is the author and joint author of many papers, and the book "Natural Gasoline" which was the standard reference work in that industry for many years. He was a pioneer in the development of the LPG industry.

J. E. GOSLINE has been made assistant general manager of the producing department of Standard Oil Co. of California. He formerly was manager of the southern district at Los Angeles and now will move to San Francisco.

J. H. Thatcher, formerly manager of the gas producing division, moves to Los Angeles as southern manager and is, in turn, succeeded by R. E. Clarke. W. C. Johnston has been appointed general superintendent of the southern district.

DR. GUSTAV EGLOFF of Universal Oil Products Company spent the month of July in Europe visiting Brtiain, France, Belgium, Holland and Czechoslovakia. He presented papers at a symposium at St. Andrews, Scotland, sponsored by the Royal Institute of Chemistry; and at the Eleventh International Congress of Pure and Applied Chemistry in London. He also participated in a meeting of the permanent council of the World Petroleum Congress to decide on a definite date for the next meeting of the congress. Dr. Egloff was to lecture before the Societe Belge pour l'Etude du Petrole in Brussels, and at the University of Delft, Holland.

J. M. EVANS has been appointed chief engineer and chairman of the board of engineers of Standard Oil Co. of California. He succeeds H. H. Hall, now a director and vice president of Trans-Arabian Pipe Line Company.

Mr. Evans began with Standard in 1915, on graduation from the University of California. After service in World War I, he returned to the company's engineering department in 1920. From 1929 to 1939 he headed the civil engineering division, and in 1943 he was made assistant to the chief engineer.

Standard also announced three other appointments in its engineering department. R. W. Parker and E. S. Warner became assistant chief engineers and A. W. Horton assistant to the chief engineer.

SELDON R. SELF has resigned as Houston district geologist for Amerada Petroleum Corp. Mr. Self was senior district geologist for the company at the time of his resignation, having been with the company for 19 years. Dr. Self first joined Amerada in West Texas in 1928, was transferred to East Texas in 1935 and to Houston in 1944. His future plans have not yet been announced.

Seldon R. Self

JACK MUNHALL, former member of the staff of The Washington Post and who served on General MacArthur's public relations staff in the Pacific during the war, has joined the public relations department of Standard-Vacuum Oil Company.

Mr. Munhall joined The Washington Post in 1936 and was there until his enlistment in the Army in 1942. In June 1945 he was ordered to duty with General MacArthur's PRO staff in Manila. Several months later he transferred from GHQ in Tokyo to the staff of the Commanding General, Port of Yokohama, for a special job as plans and training office. Since being released from the Army, Mr. Munhall has been in public relations work for Standard Oil Company (New Jersey).

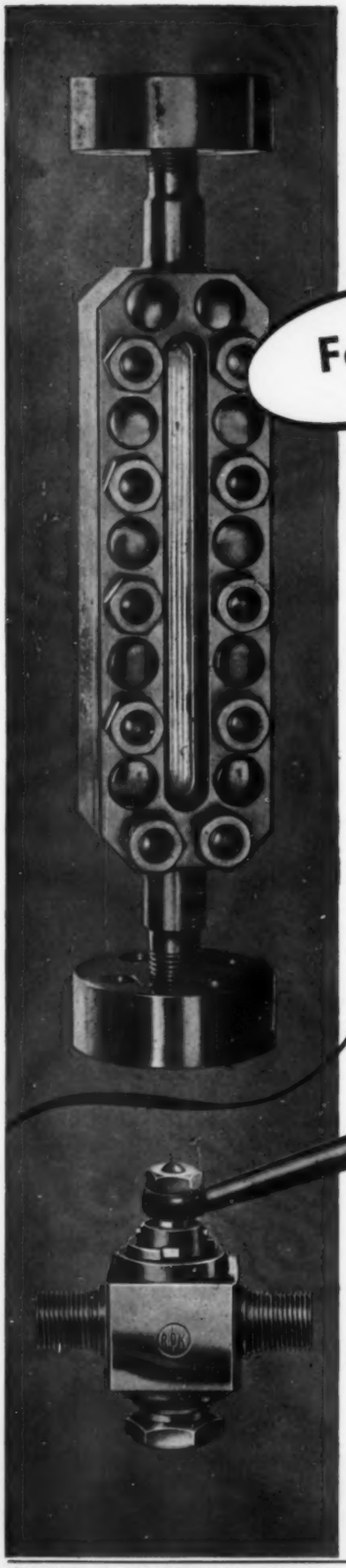
STANDARD OIL DEVELOPMENT CO. has appointed two assistant directors in the development division and awarded professional titles of honor to three research engineers. Promoted to assistant directors of the petroleum and chemical sections, respectively, are Homer Z. Martin and Harold W. Scheeline. Honored as senior engineering associates are Charles E. Hemminger and Walter G. Scharmann of the development division, and Steward H. Hulse of the process division.

R. REA JACKSON has been appointed manager of the Paulsboro, N. J., refinery of the Socony-Vacuum Oil Company, Inc. He succeeds Howard W. Sheldon, who has been transferred to the company's New York headquarters to become assistant director of Socony-Vacuum laboratories. Mr. Jackson has been general superintendent of the Beaumont, Texas, refinery of the Magnolia Petroleum Co. for the last ten years. Mr. Sheldon joined Socony-Vacuum as an engineer at the Paulsboro refinery in 1926. In 1929 he was transferred to New York and became chief chemical engineer of the research and development department. Four years later he returned to Paulsboro as chemical engineer and in 1943 became general manager of the refinery.

D. W. WOODS, who recently was named general counsel of General Petroleum Corporation, has been elected to the board of directors. Mr. Woods resigned as secretary and J. M. Jessen, who has been assistant secretary, was named to succeed him.

HUGH A. NEAL, assistant manager of the Perco division of chemical products department, Phillips Petroleum Company, was recently awarded the Silver Star for gallantry in action. During the war Neal held the rank of lieutenant colonel and commanded the 463rd Parachute Field Artillery Division.

Hugh A. Neal



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R. G. van der Woude

Alexander Fraser

H. S. M. Burns

Shell Makes Management Changes

Several important changes, effective July 1, have taken place in the top management of Shell interests in the United States. On that date R. G. A van der Woude retired from his post as president of Shell Union following forty years of service with the Shell organization. Alexander Fraser, who has been the executive head of Shell Oil Company, Inc., succeeds Mr. van der Woude, and H. S. M. Burns, who has been senior vice president of Shell Oil under Mr. Fraser, steps into the presidential chair.

During the early years of Mr. van der Woude's connection with the Shell organization, he saw service in many parts of the world. In 1922 he came to St. Louis, headquarters of Shell Petroleum Corporation, as vice president of that company. Two years thereafter he was transferred to Mexico, subsequently was called to assume executive duties in Europe, and in 1931 returned to St. Louis when he became president of Shell Petroleum. In 1933 he was elected president of Shell Union Oil Corporation, holding company of Shell's American interests, a position which he held continuously until his retirement.

During the war years, Mr. van der Woude was a member of the Petroleum Industry War Council which advised and worked with the Petroleum Administrator to solve the problems involved in supplying the oil needs of the armed forces and industry of the United States and its allies. Mr. van der Woude gave himself unsparingly to this work but also found time to take a leading part in organizing relief for oppressed peoples. He founded and became first president of the Queen Wilhelmina Fund, which organization devoted itself to aiding the peoples of Holland and the Netherlands East Indies both during and after the war. Many thousands of needy people have been benefited because of the fine work done by this organization.

Mr. van der Woude has always shunned the publicity which naturally accrues to a person of his position in the business world. But among those who guide and plan the future of America's fourth largest industry, he is known as an able administrator whose wise direction and counsel were highly valued.

Alec Fraser brings to his new position of responsibility a background of nearly four decades of varied experience with the petroleum industry. Following several years' association with asphalt and petroleum operations in Trinidad and Venezuela, he served as secretary of the Inter-Allied Petroleum Council during World War I. Following the war he returned to the United States where in 1919 he joined the Shell organization in a vice presidential capacity. In 1929 he moved to St. Louis with increasing responsibility with Shell Petroleum Corporation, becoming a vice president of that corporation in 1930, and in 1933, president. In 1939 when Shell's operations throughout the United States were combined in a single operating company, he became president of Shell Oil Company, Incorporated, and continued as such until his recent shift to Shell Union.

H. S. M. Burns who becomes president of Shell Oil has been associated with the Shell Group for more than twenty years. A graduate of Aberdeen and Cambridge Universities, he joined the Shell Oil Company in California as a geophysicist in the exploration department. Subequently he was transferred to the manufacturing and marketing departments on the Pacific Coast, serving in the latter as a division manager and later as general sales manager.

In 1935 Mr. Burns went to South America, spending several years in Colombia where he organized and directed the Shell Group's exploration and production activities. He returned to the United States last year as senior vice president of Shell Oil Company, Incorporated, wtih headquarters in New York where he continues to serve with the more advanced responsibility of president.

ALBERT H. MAYO has succeeded the late J. W. Koontz as Tulsa district engineer for the refinery sales division of Oil Well Supply Co. Mr. Mayo has had many years' experience in natural gasoline plant and refinery construction since his graduation from Carnegie Tech in 1922.

ARTHUR J. DANIEL has been elected president of Battenfeld Grease & Oil Corp., Kansas City, following the recent death of J. R. Battenfeld. Mr. Daniel was one of the organizers of the company and previously served as vice president.

Ralph R. Matthews was elected executive vice president. He has been with the company since 1928.

HARRY N. STAMPER, construction engineer for Humble Oil & Refining Company's production department in Houston, has been appointed assistant chief civil engineer in that department. Mr. Stamper joined Humble in 1927. He has been engaged in the development of construction methods and designs for the production department and has been directly in charge of construction of numerous gasoline and compressor plants.

E. Q. BECKWITH, formerly manager of product supply division of Phillips Petroleum Co., chemical products department, has joined Anchor Petroleum Company in Tulsa as manager of Anchor's LPG procurement division. He had been with Phillips since 1933. During the war he was on military leave for several years during which he was advanced in rank to Major and placed in charge of an ordnance depot in Ohio where he had charge of inspection and shipment of tanks and other motor vehicles. Before the war he spent some years in research and sales promotion on the use of LPG as motor fuel, particularly in trucks. This program had just begun to gain momentum in the Mid-Continent when it was halted by the war.

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Henry N. Greis

Henry N. Greis, 67, president of Deep Rock Oil Corp, Tulsa, died July 16. Mr. Greis also was president of Burke-Greis Corp. and a director of Mid-Continent Petroleum Corp and Oklahoma Natural Gas Co. Mr. Greis was receiver for Deep Rock for several years and headed the company after he was able to straighten out its financial affairs.

M. W. Cook Goes To Near East

M. W. "Monk" Cook has been appointed Near East sales and service representative for Security Engineering Co., Inc., International Derrick and Equipment Co., Bryon-Jackson Co., Patterson-Ballagh and Falcon Products. He is going to Cairo, Egypt, via London. His headquarters will be at Baghdad or Busra, Iraq. Mr. Cook has had many years of experience as tool pusher, driller and cementing company salesman and executive in California, Oklahoma and Texas. He has operated formation tester and cementing equipment abroad for the Iraq Petroleum Co.

Ring Reelected

D. T. Ring of Preston Oil Co., Columbus, Ohio, was reelected for a second term as president of the Pennsylvania Grade Crude Oil Association at the 23rd annual meeting of the association.

Other officers who were reelected include: B. T. Haskins, Ebenezer Oil Co., Wellsville, N. Y., first vice president; George J. Hanks, president of South Penn Oil Co., Bradford, Pa., second vice president; Fayette B. Dow, vice president and general counsel; Samuel Messer of Quaker State Oil Refining Corp., Oil City, Pa., treasurer; Walter R. Reitz of Quaker State Oil Refining Corp., Oil City, assistant treasurer; C. L. Suhr of The Pennzoil Co., Oil City, assistant treasurer; and W. C. Wenzel of Oil City, executive manager.

L. C. Welch

L. C. WELCH has retired as general manager of lubricating oil sales and technical service departments of Standard Oil Co. of Indiana, after 30 years with the company. He is succeeded by Dwight F. Benton, his former assistant.

Mr. Welch joined Midwest Refining Company in 1917 as chief engineer of refinery construction at Casper, Wyo. Midwest later became a subsidiary and finally was merged with Standard. In 1919 he was made manager of lubricating oil sales for Midwest and in 1925 was appointed to a similar position in Standard's general office in Chicago. He was made a director in 1944. For 14 years he was chairman of the lubrication committee of the American Petroleum Institute and served on numerous other industry committees.

Mr. Benton joined Standard of Indiana in 1923 as a member of the first sales engineering school at the Whiting, Ind., refinery. In 1946 he became assistant general manager of the lubricating and sales technical service departments at the general office in Chicago, serving under Mr. Welch.

E. G. McKeever

Emmett G. McKeever, 55, president of Pan American Petroleum & Transport Co., The American Oil Co., Mexican Petroleum Corp., Lord Baltimore Filling Stations and an officer in other allied companies, died of a heart attack July 9. He had been with the same group of companies his entire business life, having begun in 1915 as secretary to the general manager of Mexican Petroleum Co., one of the Edward L. Doheny companies which was sold to Standard of Indiana in 1925.

Mr. McKeever participated in the organization of Pan American in 1916, and in 1932 he was a key figure in the realignment which included sale of foreign properties to Standard Oil Co. (N.J.) These properties included production in Venezuela and Mexico and the then largest refinery in the world at Aruba, D.W.I.

Seven years after he took his first secretarial job and at the age of 30, Mr. McKeever was elected a director of Pan American. He was elected first vice president in 1937 and president in 1945.

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E. B. Fowks

Emsco Personnel Shifts

E. B. Fowks, former export sales manager, has been appointed manager of the advertising and sales promotion department of Emsco Derrick and Equipment Company. He has been with Emsco for 24 years. He is past president of the Los Angeles Chapter of the Nomads. In his new position he will also retain jurisdiction over the patent department.

K. F. "Ted" Forsyth

K. F. "Ted" Forsyth, manager of California sales, has been appointed export sales manager to succeed Mr. Fowks. He has been with Emsco since 1924. He is a member of the Los Angeles Chapter of Nomads. In his new position Ted will have charge of California and all export sales.

Visits South America

Terry Russell, sales engineer for the McEvoy Company, Houston, is in South America for a three-month tour of oil fields. He will conduct a survey of producing conditions as they apply to his company's wellhead and gas-lift equipment.

New Warehouse

A new Patterson-Ballagh warehouse has been opened at 3100 South Central Ave., Oklahoma City, with Preach Gooden in charge. On June 1 Preach was transferred from Rangely, Col., it was announced by Jack Magoffin, Mid-Continent manager for the company.

Corrosion Research Continues

T. S. Bacon, chief engineer of the Lone Star Producing Co. has been reelected chairman of the Corrosion Research Project Committee of the Natural Gasoline Association of America. M. E. Holmberg of Phillips Petroleum Co. is vice chairman. The research program was begun three years ago by a group of 25 companies which were encountering highly destructive corrosion in gas condensate wells.

In the past three years the group has accumulated a vast amount of data on the use of inhibitors, although no universaly effective substance has yet been found. Work has been done also on alloys and metal coatings. Present plans are to continue the research for five additional years.

Bareco To Modernize Refinery

Bareco Oil Co. will enlarge and modernize its Wichita, Kansas, refinery according to an announcement by V. R. Oakley, vice president. The program includes installation of a Perco catalytic desulfurization and reforming unit, licensed by Phillips Petroleum Company. Steam generating facilities will be replaced and storage will be enlarged. Consideration is also being given to additional facilities and equipment for recovery of propane and butane for LPG.

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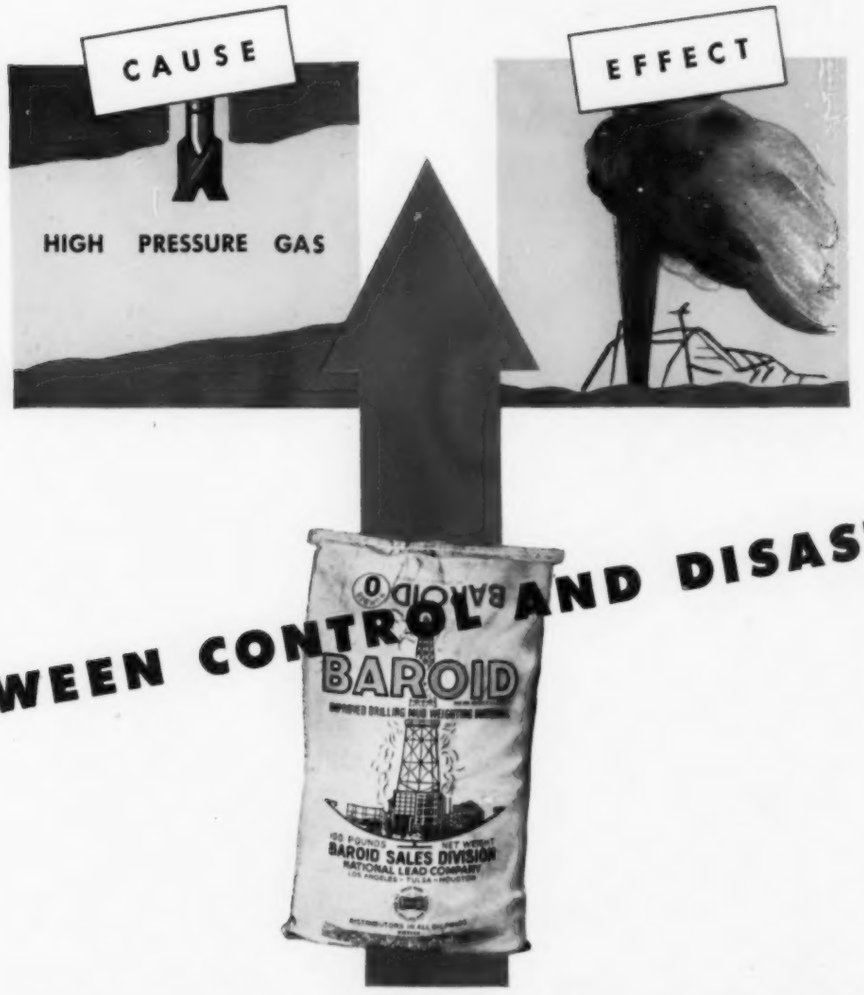

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Single Column Catalytic Unit Installed at Detroit

(Continued from page 57)

company in position to meet rising gasoline octane specifications, made a contract with Universal Oil Products to design and engineer a plant embodying the simplified and economical features which Universal had developed for adapting the fluid catalytic cracking process to refineries of moderate capacity. Actual installation was done by Aurora's own construction department with supervision by Universal's engineers.

The combination of reactor and regenerator in a single column, with the resulting reduction in structure and piping, are factors which contribute to reduced construction costs. Maximum utilization of existing material and equipment was incorporated in the design, thereby effecting additional savings without detracting from operating flexibility. The Aurora unit is designed to operate in a variety of ways to meet changing operating and market conditions.

With this new Universal fluid catalytic cracking unit, Aurora is today able to produce gasoline for public consumption which is equal or better in quality to that of any other refiner.

Guier Heads Unit Rig

William Guier has been elected president of the Unit Rig & Equipment Co., Tulsa. R. E. Carter was named vice president and F. C. Morton, secretary treasurer. The three were partners in the company prior to the death of J. R. Underwood last year and have purchased the interests of Mrs. Jennie Underwood and H. S. Chancey.

J. G. SCHAAFSMA has been named assistant to the manager of laboratories department of General Petroleum Corp. The Laboratories' process and economics sections will report to him. Bert Folda, Jr., has also been promoted to a position bearing the same title and will supervise the chemical and lubricants section as well as the Vernon Control Laboratory.

Mr. Schaafsma, a Caltech graduate, has been with General since 1934 and previous to his current appointment was supervisor of the process section at Vernon. Mr. Folda joined the company the same year as his colleague after graduating from Stanford and recently has been supervisor of the chemical lubricants section.

JAMES W. KAY, assistant to the traffic manager in charge of the foreign shipping section of Standard Oil Company of New Jersey, was guest of honor at a dinner July 15 on the thirtieth anniversary of his entering the company's employment. He started as a clerk in the marine department in 1917. In 1927 he was transferred to the West India Oil Co., and in 1935 to the South American sales division of the Jersey Company. He was assigned to his present post in 1941.

SAMUEL H. WILLISTON has been elected vice president and general manager of the Sperry-Sun Well Surveying Co. He succeeds G. L. Kothny who died May 28. Mr. Williston was identified with Sperry-Sun Well Surveying Company at the time of its formation in 1928 and was instrumental in developing the original gyroscopic well surveying instruments. He will continue as vice president and a director of the Cordero Mining Company, also a Sun Oil subsidiary, which has mercury mining operations in Oregon, Nevada and California.

Mr. Williston joined Sun Oil as a paleontologist at Maracaibo, South America, in 1922. He had previously served with the Illinois State Geological Survey and as a consulting geologist in Colombia, South America. He became chief geologist for Venezuela-Sun Company in 1925 and the following year was assigned to Sun Oil Company's Dallas office to engage in electrical geophysical research. Since 1936 he has been on the West Coast as a geologist and in the Sun Mining operations.

Samuel H. Williston

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Organic Chemicals from Petroleum

(Continued from page 45)

for its own operations, "know-how" developed through chemical manufacture has contributed greatly to the oil industry. Acid absorption, catalytic hydrogenation, alkylation are all chemical operations now vital to refineries. The synthetic chemicals and the petroleum industries are, then, parallel in their recent history, a condition which in all probability will apply to their future.

Another consideration in predicting the future of organic synthetic chemicals is the controversial point of natural vs. synthetic products. This subject has been discussed extensively in recent trade literature. The consensus is that the synthetic chemicals enjoy two main advantages: constancy of quality and progressively decreasing market price.

A third advantage characteristic of synthetic chemicals is, it might be added, the fact that their supply, once established, is relatively more dependable, since the raw materials from which they are manufactured are usually in steadier supply than the plant or animal sources from which natural products are generally obtained.

Finally, a more practical argument in predicting a favorable future for the industry is the amazing expansion it is currently undergoing. According to a recent report in the Wall Street Journal, the current growth of synthetic chemical manufacture, for a specific section of the country—the Gulf Coast area—already involves an expenditure of one-third of a billion dollars.

From these considerations and observations of the basic technological advances in the industry of petroleum and petroleum derivatives for the past decade, it seems justifiable to conclude that the period of industrial progress aptly termed the "petroleum area" has not yet reached its full maturity.

Low Temperature Rubber Process

Synthetic rubber with characteristics apparently equal to natural rubber for automobile tire purposes has been announced by Phillips Petroleum Co. as a result of research into low temperature production methods. Thus far only laboratory test data on the new rubber is available, and the company points out that final evaluation must await extensive road tests.

In discussing the new discovery, G. G. Oberfell, vice president in charge of research, said that even if this method does not prove out on the road, he is confident that the time is not far distant when synthetic rubber will be produced which will be equal or superior to natural rubber in every respect. A very large number of researchers are at work on rubber problems and are learning more every day.

"There have long been indications that improved properties result from polymerizations carried out at lower temperatures than are now commercially practiced in the manufacture of synthetic rubber by emulsion techniques," Mr. Oberfell said. "This approach has not heretofore been economically feasible because of the extreme slowness with which butadiene and styrene combine to form rubber at the lower temperatures. A further limitation has been imposed by the formation of ice in water-emulsion systems at freezing temperatures.

"Phillips' work in the low temperature field has resulted in a novel combination of chemical ingredients, including catalytic initiator systems employed in the polymerization recipes. This combination permits the manufacture of synthetic rubber at commercially feasible rates of reaction with attainment of superior properties at the lower temperatures employed. Summarizing the information regarding manufacture, compared with present GR-S, the basic raw materials, butadiene and styrene, are the same. However, successful polymerization at a much lower temperature is achieved primarily by means of different chemical ingredients used as catalysts.

"Preliminary estimates indicate that the ultimate cost will not differ greatly from the cost of manufacture of GR-S. It appears likely that present GR-S plants may be adapted, within reasonable limits, for low temperature manufacture of the new rubber.

Existing butadiene, styrene and polymerization facilities would remain useful, but the polymerization facilities would require additions and modifications."

Nitrosyl Chloride Booklet

A new booklet on nitrosyl chloride has been prepared by Solvay Process Co. Chemical and physical properties, handling, laboratory preparation, safety measures and typical industrial applications are described. Also included are charts, sketches, a bibliography and patent references. Copies may be obtained by writing to The Solvay Process Company, Product Development Section, 40 Rector Street, New York 6, N. Y., and asking for booklet NC #1.

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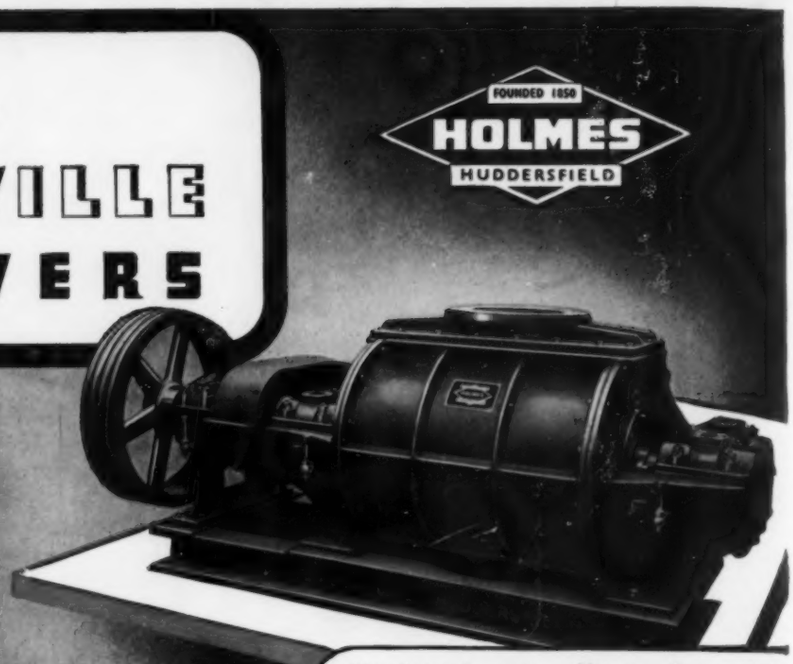

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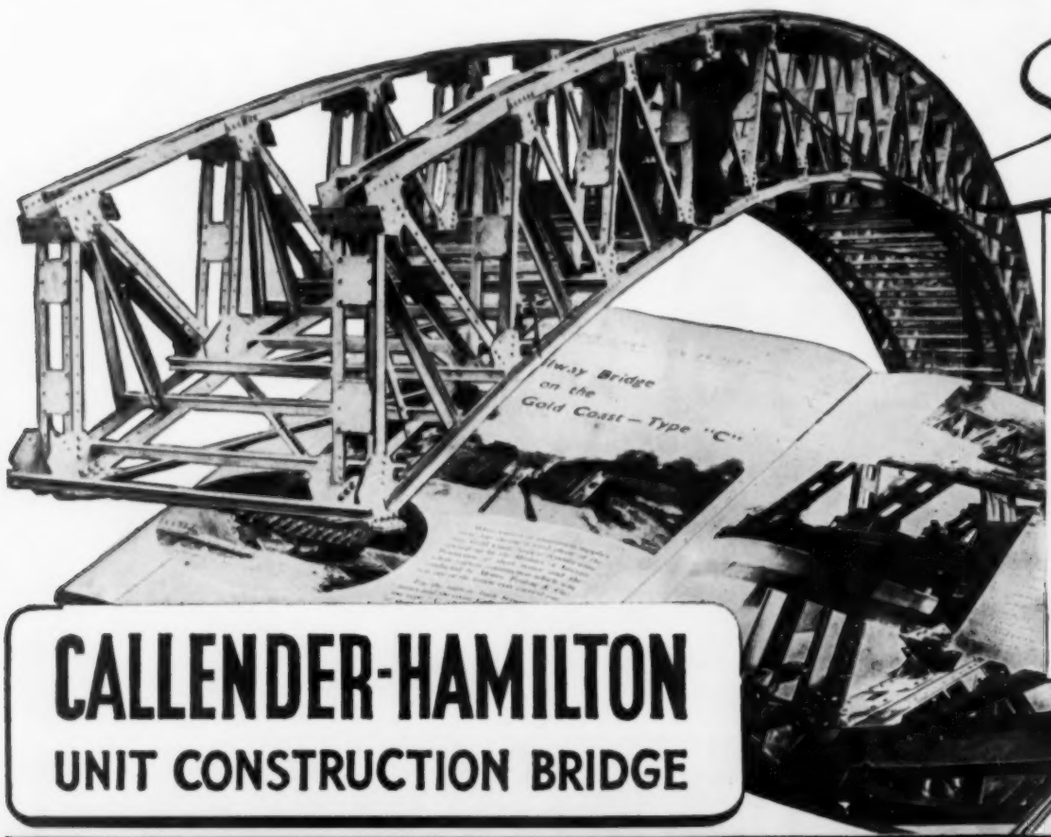

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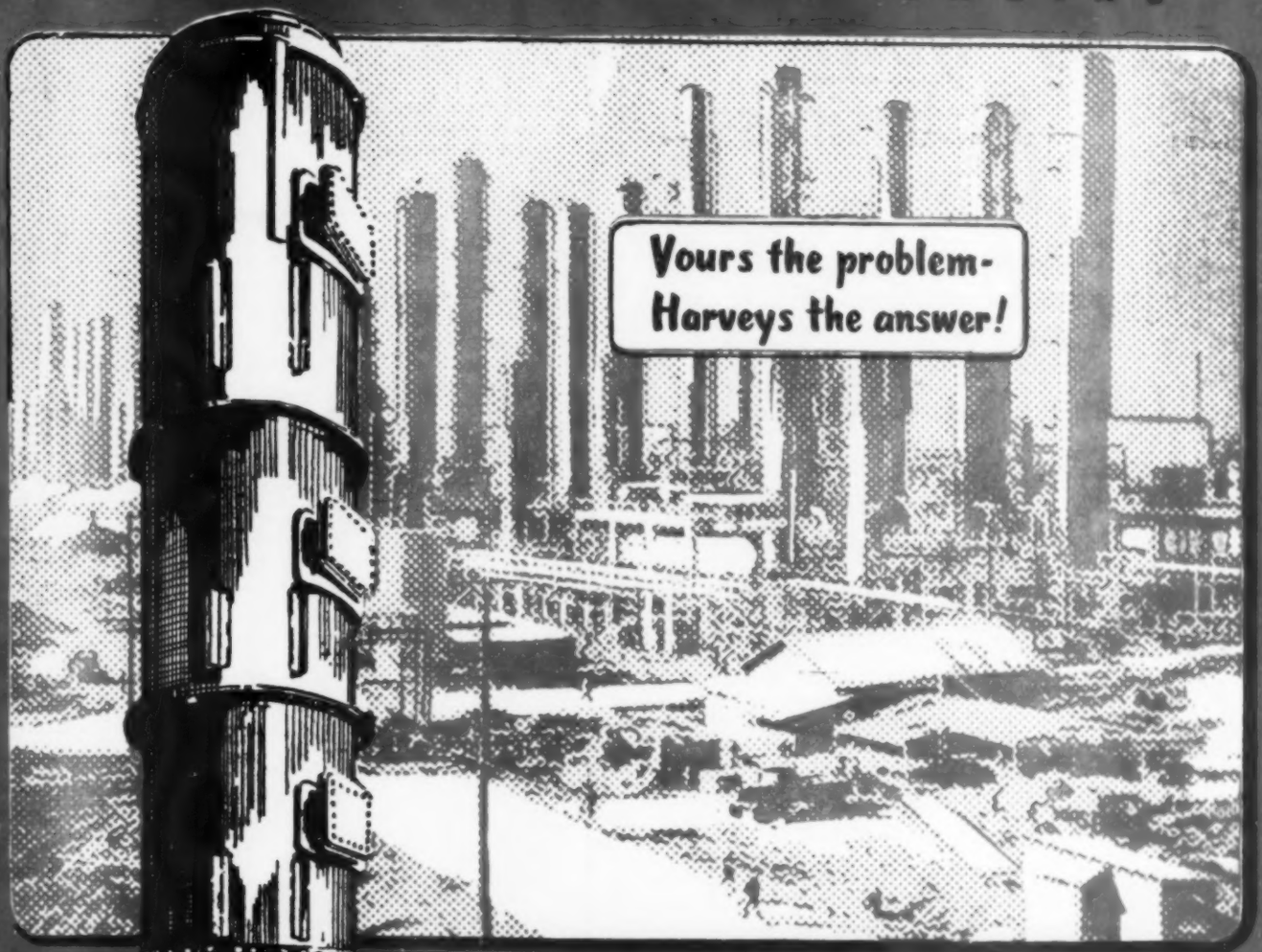

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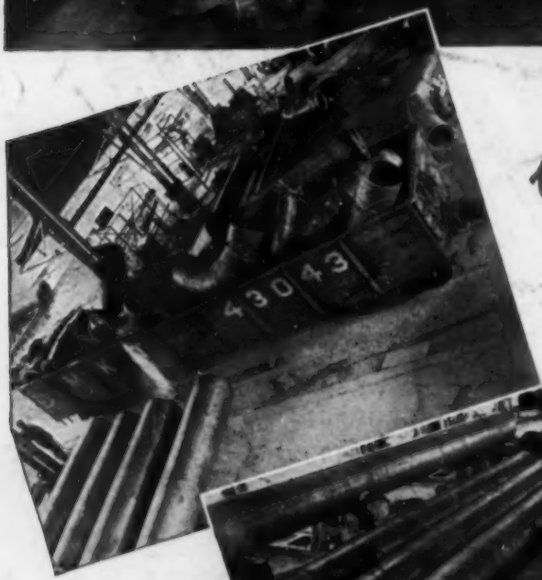

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